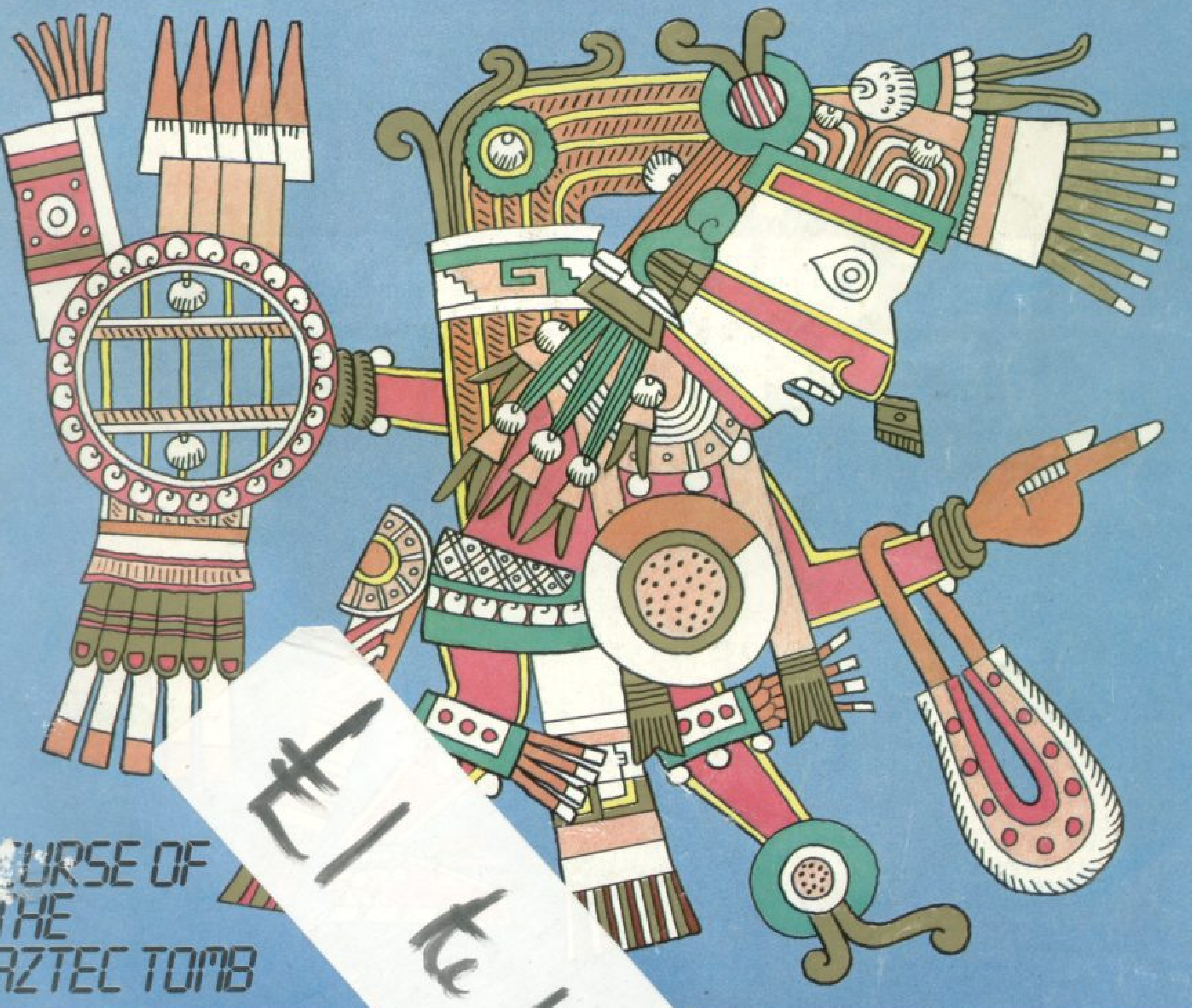
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News & Reviews

Listings







On the warpath...

Just when all seems lost that cavalry bugle sounds and the Indians take flight.

But that may be true of films but don't expect it in our Warpath game.

Ron Potkin is serialising his thrilling wild west war game in such a way as to improve your own programming skills.

Ron is a self-confessed memory miser and a Briton whose games earned a special prominence in the US's micro computer infancy.

At the end of the series, you'll not only have a game which John Wayne would excel in, but enough knowledge and a working base on which to build your own wargame scenarios.

Turn to page 88 and take to the Warpath.

Features

Editor Terry Pratt, **Staff Writer** Eugene Lacey, **Editorial assistant** Susan Cameron, **Designer** Linda Freemar, **Production editor** Tim Metcalfe.

Advertisement manager Rita Lewis, **Advertising executive** Neil Wood, John Phillips, Louise Matthews **Advertisement assistant** Louise Flockhart, **Publisher** Tom Moloney

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Cover: Stuart Briers. **Next issue: January 16th.**

BEFRIEND AN ALIEN TODAY

NEXT MONTH

In Space Watch we first invited you to befriend the aliens, long before anyone had seen a pirated copy of that E.T. character.

Now our science fiction specialist, David Langford takes the diplomacy before galactic destruction line a step further with Taming The Invaders.

This really is a game with a message, in fact there's lots of messages, all sent by you — the player — to the teeming millions of confused space creatures thronging our atmosphere.

There's getting to be so many of the little green devils out there that they'll soon be in danger of polluting the atmosphere. Can you successfully find the alien code to persuade them your species is intelligent? . . . Is this asking too much of *C&VG* readers? No, of course not!

Follow the second article in our Warpath series, which not only promises to tidy up and speed up your programming, but also gives you a fully-fledged Wild West wargame at the end of the article.

There's also some classic games waiting for you between the covers: Crazy Kong relives the thrills of a well-known arcade game; Escape from the Pyramids of Mars; Over the Orchard Wall; Airline Pilot; Golf; Pompeii and many more.

NEXT MONTH

You will notice that the February issue of *Computer & Video Games* stands out a little more on the news-stands.

This is because it is not alone on the shelf but closely closetted with a friend, *The C&VG Book of Games.*

Forty-eight pages of games for all the popular computers, tightly packed into one super free supplement to ensure that the Christmas micro is put to good use.

Of course we won't be cutting down the usual high quality content of the magazine, we've just been working specially hard, looking out and testing extra programs for the *Book of Games* and we hope you think that it's been worthwhile.

Let us name just a few: Star Trek, Snakes, Ghosts, Victorian Sewers, 3D Maze, Space Attack, Golf, Word Find, Magic Square, Red Alert and others too numerous to mention. Be sure and get your free *Book of Games.* Newsagents have been warned to expect the rush from Saturday January 15.

THE SEVENTH EMPIRE GOES TO WAR

The Seventh Empire will be at war as from the February issue of *Computer & Video Games* and we want you to get involved in the conflict.

A rulebook is on the way to all of you who have so far entered this unique play-by-mail game but the rules are also briefly outlined for the curious on pages 16 and 17 of this issue.

If you haven't yet sent in your entry form then please fill in the form below straight away and despatch it to us. Because of the strange deadlines imposed upon us by Christmas holidays, only those forms which reach us by December 21st will be entered for the first round of the game in our February issue. Any entries which arrive later will be included in the March issue game of Seventh Empire.

The Seventh Empire is a unique game/competition which will only cost you the price of a stamp each month. Specially designed for *C&VG* by Mike Singleton, the inventor of Britain's top computer-moderated-game, Starloard, it can be played by up to 10,000 readers.

There will be a winner each month and an overall winner over the entire run of the game. The winner of our first turn in February will win a Colour Genie home computer.

Every player will control one of the galaxy's many tribes with seven space fleets to despatch around the star system. He will hire his fleets out as mercenaries to take part in the conflicts between rival empires, choose plum planets rich in resources to raid, commit acts of piracy on rival fleets or trade his way up to a high score by careful watching of the galactic fortunes and commodities.

The game is moderated by a Commodore Pet computer at our end but there is no luck in the play, only skill, foresight and sheer animal cunning. Each month a new galactic map will be published in *C&VG* to show ship numbers at each star system and help you work out your tribe's profits.

We will also publish battle reports which may have changed the face of the galactic map. A diplomatic diagram which will show how the empires have reacted to wars and raiding ships, which empires are currently at peace and which have declared war.

Information on where the imperial ships are travelling to and a Gateway chart which will show which of the 600 or so routes were hit by pirates. From this information you will be able to piece together your score for the turn.

At our end the computer will come up with a top 10 high scorers for that issue. Scores will vary from several thousand points amassed to minus figures for those who traded badly.

Send the form below to: The Seventh Empire, *Computer & Video Games*, Durrant House, 8, Herbal Hill, London EC1R 5JB.

Several of you sent in entries on letters and other pieces of paper last month and we decided to accept them, but if you are a new entrant please send off this form on the left cut out at the dotted line.

Please include me in the Seventh Empire Competition.
The name of the tribe I will play in the game is:

. . . .

My name is: . . . .

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Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

BIRTHDAY BOUQUET!

Dear Editor,
Happy first birthday from one of the countless satisfied readers — and shame on you for not mentioning it yourselves!

Yes, it was one year ago that *Computer and Video Games* first hit our news stands. And what a year it's been! Twelve excellent games programs for the Atom, Fabulous articles and artwork, great reviews and your little cartoon Bugs provide good humour (despite their nasty habits).

I hope you continue for many more years to come with your very high standards of publishing. And as long as you keep printing games for the Atom you'll have at least one loyal reader.

Keith Robertson,
Carshalton,
Surrey

PIMANIA PIMANIAC!

Dear Sir,
I am a Pimaniac! And I'm answering your call in the November issue. First, let me say that Pimania is absolutely fantastic — and with the golden sundial as its prize I have become completely hooked on it.

It might be useful for other readers to note that the way to move around the world of the Piman is completely logical, if you take good notice of the clues given just after you get into the program. Unless you spot this you could be wasting days going up blind alleys!

The Piman isn't really as horrible as he makes out, if you learn to treat him right. You'll have to learn what takes his fancy in different parts of his world, and what upsets him.

To tell the truth I still haven't got a clue where the sundial is — but as long as Pimania continues to keep me rolling about with laughter I don't care.

My friends who have other machines want to know for what other micros Pimania will be produced and when.



While I think that it is good that you will be giving readers hints and tips in your pages. I hope you don't give too much away — it's taken some of us a long time to work out the mysteries of Pimania.

Well done *Computer and Video Games* for bringing us news of Pimania first!! Keep up the good work.

Raurie Morris,
Streatham,
London.

Editor's reply: The micros next in line for Pimania are the Dragon 32 and BBC Model B planned sometime for the New Year.

AND HERE'S ANOTHER!

Dear Pi-men,
Does the line the Pimania song "I haven't got a lot of hair" refer to Clive Sinclair, and is the world of the Piman inside uncle Clive's head? Also is it the man himself in the background at the end of the song? Also is it Ian Dury who does the vocals?

Does the can of worms refer to one of your earlier sets of games and can I use the megaphone anywhere? Is the Pi symbol significant?

Lastly, when the Piman tries to sell me a tee-shirt, is this part of the game or are you just trying to get more money out of me? By the way, I have become completely addicted to the search for the golden sundial of Pimania, and I'll find it if it's the last thing I do!!

Jennie Barratt,
Kowloon,
Hong Kong.

Editor's reply: Here are the answers to your questions from Automata.
No.
Who knows what's inside Clive's head?
If we had asked him to the recording studios he would have turned up 18 weeks late!
No comment.
Yes.
Yes.
Totally!
Of course it's for more money.

SOFTWARE WORRIES . . .

Dear Sir,
I own a 32K Atari 400. I'm becoming very concerned about the service being offered by some software firms. Quite a number of firms are offering programmes for the Atari knowing, and freely admitting that they have no stocks at all of the material and in some cases they do not even have a delivery date for when stocks will be available.

In some cases the problem is that the firm, in all innocence has misjudged demand or has been let down by a supplier. However, in some cases failure to supply appears so common that the suspicion must arise that virtually no stocks are held and the firm waits for a customer's order before contacting the wholesaler.

Having parted with your money, getting hardware repaired or defective software replaced is not easy. At the time of writing my Atari has been away a month having a "minor" fault repaired.

M. P. Nicholson,
Bridgwater,
Somerset.

QUESTIONS ANSWERED

Dear Sir,
I have a few questions to ask about the ZX81. The first question is whether or not you can invert the screen so it prints black on white and if so how do you do it? Also there is the question of where you can get a cheap hi-res graphics from?

I have thought of a great idea! Why don't you have a place in your magazine where people can send in small programs they have written for small amounts of money?

Finally, I am thinking of buying a ZX Spectrum and selling my ZX81. What would be the highest amount of money I could get for it?

J. Morton,
Bishop Auckland
Co. Durham

Editor's reply: To invert the screen, try the graphics toolkit from JRS Software or even the 4K graphics ROM from DK 'Tronics. This will also provide hi-res graphics. Kayne also do a cheap hi-res graphics board.

Many of our contributors tell us we already pay "small amounts of money" but if anyone would like to send in small routines for getting around certain problems we will look at the possibility of starting up such a page. Finally. I think you could expect around £25 for you XZ81 Mr Morton.



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SHIVA

MAILBAG

THANKS FROM A TEXAN!

Dear Sir,
A big thank-you *Computer and Video Games* for a program for my TI 99/4a. I am now buying your magazine not just skimming through it at a bookstall! I am certain many T.I. owners, there are a lot of us out here, will be doing likewise.

Will you be inviting programs suitable for the TI 99/4 or 99/4a? Stay on the Texas bandwagon.
Bernard Bailey,
Althorne,
Essex

Editor's reply: We are always interested in new and original programs Bernard. How about sending us some of your ideas.

MAGAZINE MOANS . . .

Dear Sir,
I read with interest your article on the TI 99/4a home computer, but the reference to the 99'er magazine at the conclusion of the article was of particular interest — and inaccurate. I would like to take this opportunity to inform you and your readers that MPI of Cambridge Road, Barking are no longer supplying 99'er magazines and would urge them not to part with any money.

MPI said that they were returning my subscription. That was in August and I'm still waiting!!

I would like to add that since February I received only two 99'er magazines from MPI which in my book is absolutely terrible service.
M. K. Needham,
Penarth,
South Glamorgan.

SPECTRUM SHOWDOWN

Dear Sir,
I feel it is up to BBC and Atari owners to voice their feelings about some of the facts contained in the Sinclair Spectrum brochure inserted in many computer magazines.

For any person about to buy a computer, I can assure you that the extra money spend in the purchasing an Atari 400 or a BBC micro is money well spent. Below, are some facts that are incorrect or omitted from the Spectrum brochure.

I own an Atari 400, and I have used a BBC, and they are amazing machines. Their graphics resolution is far superior to the Spectrums, and the comparison of the BBC and Atari's four sound channel to the Spectrum's channel (all one of them), is absolutely ridiculous.

The brochure claims that the Atari computer can only present five colours on the screen at once. This is not true. Three of Atari's fourteen graphics mode support 16 colours or luminances on a 15360 point array, without the intervention of the Atari's second micro, ANTIC.

Using ANTIC, it is possible to have all 128 colour luminance combinations on a 61440 array. ANTIC also offers fine scrolling windows, player missile graphics, display list interrupts etc.

Any combination of the fourteen graphics modes can be mixed on the screen, and all this leaves the 6502 almost totally free to execute the user's program.

Sinclair's brochure also omits the fact that the Atari has eight easily accessible A to D ports, four joystick ports (which can be used as outputs as well) and a cartridge slot for ROM based software.

This removes the necessity of the Sinclair computers expensive Christmas-tree arrangement of add on that have to be purchased to bring the basic machine up to the standard of most computers.

I'm sure that the cost of adding colour graphics, sound channels, A to D, Hi-res graphics and a neat case to house the arrangement, to any of Sinclair's computers would easily outprice the £199 that the Atari 400 costs, not to mention the amount of processor time available from a single micro that has to look after all of this.
M. D. Caballero,
Ramsgate
Kent.

MICROVADER MUDDLE . . .

Dear Sir,
I am still struggling with your July issue's Microvaders



program for the ZX81. I have noted the corrections which you published in your August issue but I am still not getting it working. In particular line 18 is quite hard to read and I think my error may be in that.
W. Davison,
Scotland.

Editor's reply: Some people do seem to have had difficulty with Microvaders, despite the other way we suggested they approach the program in our August issue's *Confessions of a Bug.* Line 18 may be the cause of the problem. The third line of line 18 reads: '0028BA00'. This is correct but people are mistaking the 'B' with an '8'.

PRINTING PROBLEMS

Dear Sir,
I have a TRS-80 16K level 2 and have made quite a few good programs which I want to send in to your magazine. However, I have no printer and since most of them want the program printed out I have a problem.

So is there anyone out there who could print out the program for me?
Ian Bailey,
Streatham,
London.

SINCLAIR SOLUTIONS

Dear Sir,
I have recently purchased a Sinclair ZX81 and only just getting involved in the fun of operating it. It is a tremendous piece of equipment especially for its price. We are very limited here in the options available.

Even the range of cassette programs is very limited. If I had the finance available I would certainly like to set up a completely Sinclair based computer shop here in Christchurch.

However, back to reality. I read in your July issue — *Mailbag* the problem that D. McRiner was having with 'Edit' on the ZX81. It seemed related to time the computer had been on but could it be the problem experienced with the ZX when you are running close to its memory limit?

If this is the case then I would suggest the following:
1. Place cursor at the line requiring edit.
2. Depress 'CLS' then 'NEWLINE'.
3. Depress 'SHIFT/EDIT' together.

This will clear the screen and put the line that requires edit at the bottom.

Your magazine is excellent and very useful over here with the lack of software games etc. I am currently waiting the arrival of my 16K RAM and then I will be able to really get into some clever material!
John Mitchell,
Christchurch,
New Zealand.

COULD YOU BE A WINNER?



To turn your games program into a household name you need to be four kinds of expert.

You'll need to be an expert programmer and inventive designer in the first place.

Then there's the question of the manufacturing expertise necessary to ensure the quality of the tapes will give the best possible load for your prospective purchasers.

Marketing expertise will help put the best package around the tape and make sure that the program gets maximum exposure in the right media. Advertisements must be designed for real impact and a knowledge of which specialist press to place them in, would be handy.

And how about distributing the cassettes once the purchaser's appetite has been whetted. Getting them into the computer dealer shops, setting up a mail-order system.

Never realised how much work these software houses have to put in eh?

Well that's the promise we are tethering to our new **Games Program of the Year Competition.**

Starting in our December issue we are carefully sifting through your games listings, looking out for that program we consider to be something special. And come next November we will take the writer of the best games program we receive and hawk both him and his program around.

We will take him to a top software house and get their advice on tidying the program up, securing it against software pirates, giving it that final professional polish.

We'll have a top audio company brought in, to bring out the copies of your tape in prime condition ready for loading.

The next stage in the program hype will be to have a marketing company design an advert and advise on cassette packaging. Our top reviewers will help compose the instructions on the inside leaf of the packaging.

And then we'll throw the entire weight of *Computer and Video Games* behind the program and an advertising campaign in other computer magazines aimed at giving it maximum exposure over the whole marketplace.

We'll have the cassette distributed, set up a mail order system to deal with its sale. And at the end of the month, having fully emersed our winner in the tricks of the trade and given his cassette the sort of treatment even top software houses would struggle to equal *C&VG*'s top programmer will be able to sit back over Christmas and wait for the money to come rolling in.

So start work on your next contribution to our games listing pages as soon as possible... after-all last year's winner, Nibblers, was published in the very first issue!

MEET ARKRAIDER THE DUSTMAN

Our readers' special game of computer moderated space thrills, Starweb, is still producing thrilling reports of galactic intrigue.

This month we publish one we received from one of the universe's more distinguished beings, Arkraider the artefact collector. His tale of space pirate harassment of the galactic innocents is narrated by Jenny Parsons.

It's a hard life for a bumbling old fossil like me, you know, trundling around the universe collecting up unattended artefacts. Well, if others are careless enough to leave them lying about...

By the way, I'm Arkraider, archaeologist extraordinaire — a sort of galactic dustman. My sole aim is to load rare treasures on to my somewhat battle-scarred and dilapidated fleets and creep off to some planet where I can gloat over my acquisitions.

Trouble is, there are constant interruptions. Pirates! Dastardly bands of do-badders, always plundering, more evil than Long John Silver and Captain Hook combined.

The universe is plagued by an overdose of bad guys. Berserkers, intent on blowing my world to smithereens and sending vast hordes of rampaging robots to terrify my peace-loving people. Empire Builders, fiendish, power-hungry magnates on perpetual ego-trips. They remind me of the American Presidents on Earth, years ago...

But, I digress. There are some half-way decent chaps about. Merchants, for example. Hyperspace hypermarketeers, these are relatively harmless.

Mind you, like all salesmen, once they get their foot in the door... The Apostles are pretty bearable too, although, when I arrive home after a gruelling voyage, to find my people in the grip of religious mania, it becomes very wearing.

I've had some experiences in my time. Once I found a wonderful prize, the fabled and mystical Black Box! Imbued with legendary powers, was I in luck? No, I wasn't. It disappeared, before my incredulous eyes. Vanished into the great void. On more than one occasion I've been ambushed en route to some fabulous jewel and left for dead.

What's that you said? The Ancient Pyramid has been sighted on the other side of the galaxy? I'm off!

TIM THE INVENTOR'S FOUR-WHEELED WINNER

Buggy is a design for a machine code arcade-type game requiring skill and quick thinking.

It is the invention of Tim Selkirk of Bunny in Nottingham and was judged to be the pick of the bunch of program ideas sent in by you for our September Design a Sinclair Program Competition.

Tim has won for himself a set of five ZX81 Psion cassette games and a Sinclair printer.

He has also earned the chance of a trip down to London to look around Psion's software house and see their game design team in action and talk about Buggy with them.

Charles Davis of Psion, who was part of the judges panel who checked over the entries for the competition explained the strengths demonstrated by Buggy.

"We felt Buggy deserved to win because Tim had considered the practicalities of putting his game onto a computer, in some detail.

"He clearly appreciated what could and could not be done and went further and suggested details of the application. He has developed the makings of an amusing and exciting game. The presentation is excellent and Buggy certainly has a realistic potential."

The Buggy in the title, moves over a scrolling landscape which includes a series of water jumps. The track is produced randomly at the right-hand side of the screen and by changing gear and speed the car manoeuvres over the terrain, picking up speed for the water jumps.

Although the idea sounds similar to one of the current arcade games, its way of coping with the jump problems is quite original and Tim has gone into some depth working out the best way to approach the problems involved in the game.

Buggy sounds a fascinating game, and if anyone out there would like to try and use Tim's many diagrams, flow-chart and extensive thoughts on the game, to turn it into a working program, please send a stamped addressed envelope into us and we will dispatch a copy of Buggy rules to you.

Four runners-up in the competition will also receive the five Psion ZX81 cassettes as a prize.

The runners-up are: Maggot Mania by Paul Dobson; Hang Glider by Bernard Isherwood; Tightrope Walker by D.M. Harris; and Strategic Command by Ben Bryant.

PUZZLING SOLUTIONS

We thought we'd catch a few of you out with our sneaky Mastermind Competition in November but you were up to the challenge.

The vast majority of entrants spotted that Puzzle C had been altered to make it possible.

First three out of the hat with all four answers correct were: George Stout, The Walk, Potters Bar, Herts; Ivor Davies, Bryn Road, Brynaman, Dyfed, and Robert Funai, Craig Court, Girvan, Ayrshire.

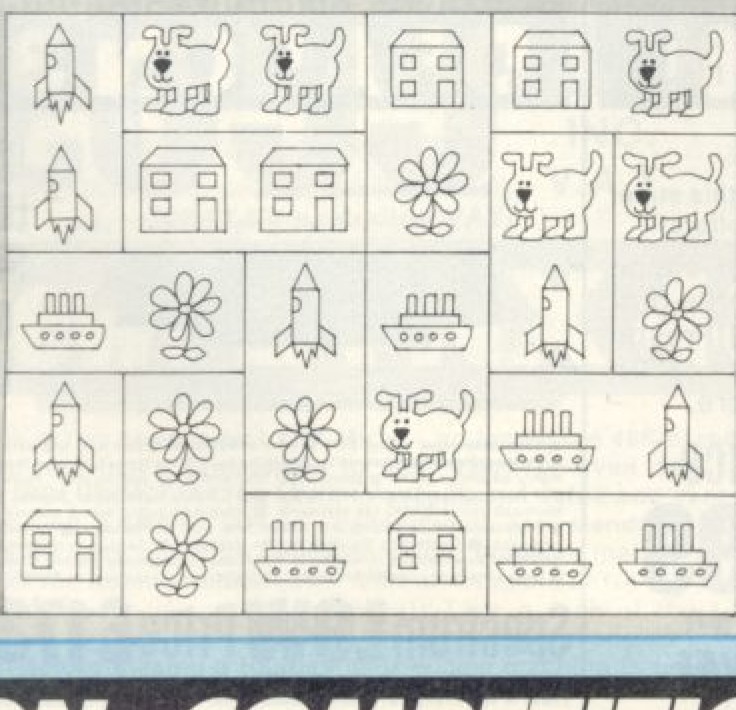
Congratulations and Invicta Electronic Masterminds are on the way.

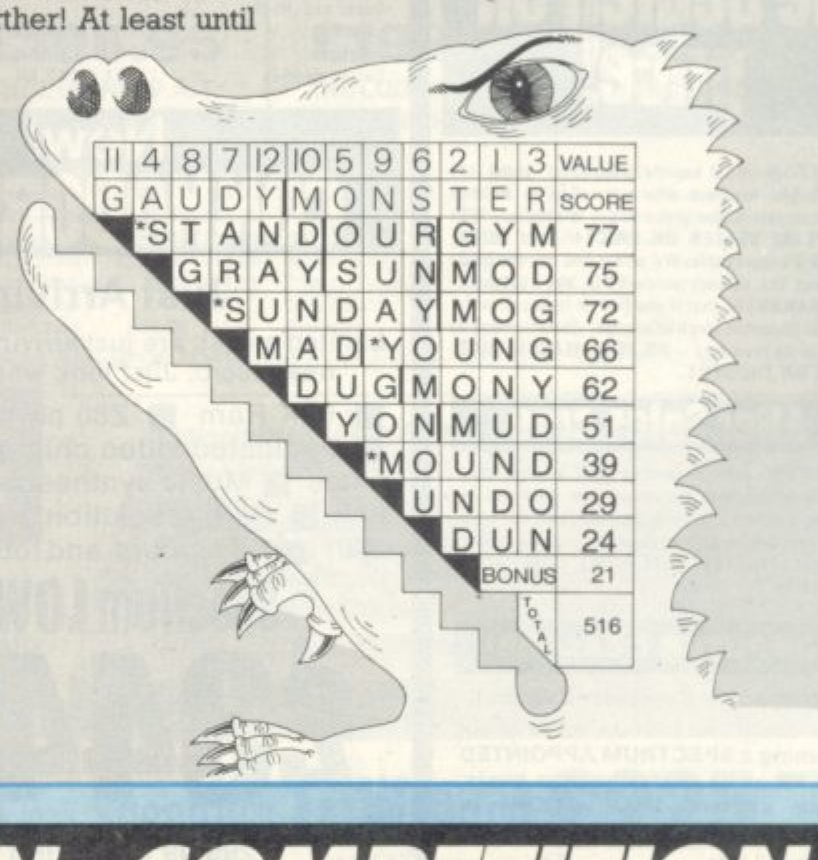
If you can shoot down the invaders in Space Attack on this month's Puzzling pages, you could win a Computer Games' hand-held space invader game. We want your entries in by January 14th at the latest and the first three with the lowest possible solutions will receive the prizes. Full details on page 72.

Right, for those of you who complained that they read the November issue's Puzzling answers before they got a chance to try the puzzle . . . read no further! At least until you have glanced at our Gaudy Monster and Omnidose brain-teasers.

If you're still with us I assume you have already looked at pages 72 and 73. Here is a sample solution for Gaudy Monster which scores 516 points, let us know if you have a better score.

And left are the dominoes, successfully pieced together from Mr Wheel's diagram.





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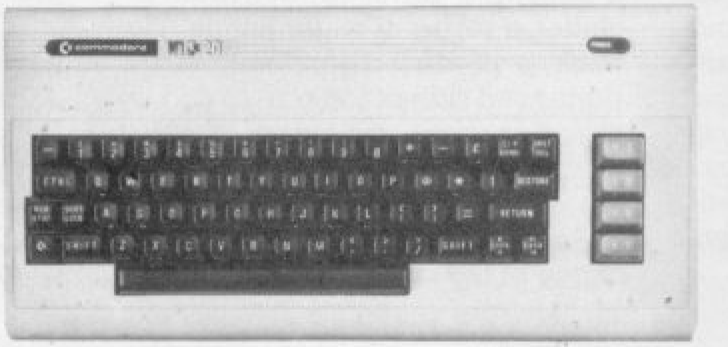
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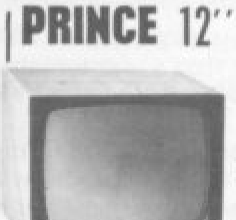
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'News Sire! The alliance between the Water Empire and the Sun Beings has crumbled, war is declared.

Three of your fleets are currently in Water Empire systems encircling sun-rich Rolek, this could be the chance you have yearned for. Other tribes affiliated to the Water Empire also feel the time is right, shall I give the orders to grab our share of Rolekian plunder?

The galaxy of the Seventh Empire is torn by war and piracy. The merchants are as coldly calculating as the war fleets. Playing off warring empires against one-another, a cunning commander can keep his tribe in profit. But he must keep a close eye on the way the diplomatic wheels are turning, how other tribe's fleets are responding.

He must know when to plunge into the risks of battle and try to alter the galactic map and he must use the Gateways wisely, running merchandise or raiding the profitable routes.

The Seventh Empire is a new way to play a game. It is quite unique in the history of publishing, computing and gaming. This one-way play-by-Mail gaming is the brainchild of Mike Singleton who runs Britain's top computer moderated game, Starlord.

The players send in orders for their fleets by post but get feedback through the pages of this magazine and it can cater from two to 10,000 players. At our end it's run by a Pet computer and all the player's orders are input into it each month.

It works out how their interaction affects the galaxy's 100 centres of population and industry. The result is displayed in the following month's issue by use of a map showing how the fleets have moved. This is not information on each individual fleet but the numbers to be found on each star and how that has altered its trade index. With a diplomatic diagram showing how the empires are shaping up for war; a Gateway route table displaying the profits on each route and some battle reports from the areas of galactic conflict, the player can find out exactly how his fleets fared and plan out his next movement commands.

The rules are set out briefly here, but each Seventh Empire player will be sent a detailed rulebook before the game gets underway in our February issue. You'll find it easy to understand the rules and simple to play but very difficult to win and work out tactically. Remember, there is no luck in The Seventh Empire — only foresight and galactic understanding! An entry form is on page 4.

THE SEVENTH EMPIRE

There are a 100 named stars in the galaxy, arranged on a 10x10 square grid, representing major centres of galactic society.

Each star system belongs to one of seven empires: Water (blue), Bloodline (red), Sun (yellow), Amythest (purple), Dead (brown), D'Taan's Science Empire (green) and the Pirate Empire (orange).

There are four types of stars: **Gateway Stars** provide rapid transgalactic movement; **Energy Stars** contain planets rich in the stellar energy used for ordinary inter-system space travel; **Gem Stars** produce the amythest-like crystals which are used to harness stellar energy; and **Elixir or Life Stars** contain the sun polyps which can turn unusable planets into those capable of supporting life.

Each player has seven starfleets under his control and each of these is considered the property of the empire from whose star it starts its turn. A player can have starships in as many empires as he wants and by sending these ships on missions from star-to-star, he tries to build up his profits.

GAME TURNS

A simple turn sheet must be sent in by the player, every month which records where he wants his fleets to travel to. And whether each one should be involved in battle, piracy, trade, raiding or just moving from star-to-star.

These orders are processed by computer so that all movement happens simultaneously. A printout of the galactic map is produced, each player's individual record updated and the winner of that turn found.

From the information given in that issue of the magazine, the player can calculate what happened to his ships and what profit he made.

You should keep a copy of your moves for this purpose. The computer keeps its own records but if you miscalculate, you could be playing with delusions of grandeur.

STAR TYPES

The four star types are represented by different symbols on the galactic map and each has a trade value: Gateway Star = 50, Energy = 100, Gem Star = 150 and Elixir Star = 200. Each star is in a square on the map, the colour of the square indicates which empire it belongs to.

Stars represent whole systems which have been colonised and each of the 100 is considered by traders to be specialist at providing one of the four galactic commodities which produce real profits. A symbol shows which star type each is.

The star name is what you should use in your orders to show how you intend to move. Other data on the star includes the number of ships in that star system at the end of a turn (bottom left). And in the bottom right is a number representing the **Trade Index** of the star for that turn, from which you calculate your profits (see example).

AT WAR

The seven empires are continually at war with one another. This is represented by a **diplomatic diagram** concocted of seven different coloured circles. It will be printed each month to show the empires at peace and those at war.

When two circles are joined by a line, those empires are at war with each other the following turn. Two empires, whose circles are not joined are at peace with one another.

The diplomatic diagram changes according to the last turn's events. Every empire checks on how many ships from each of the other empires, raided its stars. It then declares war on the empire which did the most raiding of its territory.

This empire responds by declaring war also. If there are two empires guilty of equal raiding then war is not declared. Careful study will help here.

The diplomatic diagram is important because it restricts the moves a player's fleets can make on the following turn. Trade and Movement cannot occur between stars of two empires at war.

Likewise, a fleet cannot be given an Attack order that moves it between the stars of two empires at peace.

MOVING OUT

Each game turn consists of two movement phases. In each movement phase you can move any or all of your fleets, so each ship has up to two movement orders. There are three basic ways to move.

1) **Travel Mode:** A fleet moves to any adjacent star, horizontally, vertically **or** diagonally. This mode is used in Trade or in Movement. This mode takes one phase to complete.

2) **Attack Mode:** A fleet moves to any adjacent star, horizontally or vertically **but not diagonally**. This mode is used in Raid or in Attack. This mode takes one phase to complete (see example).

3) **Gateway Mode:** A fleet moves from any Gateway Star to any other Gateway Star. This mode is used in Cargo (gateway trade), Jump (gateway movement) or in Plunder. Unlike the other modes of movement, this mode takes **two** phases to complete.

TRADING

The star Trade Index is the key to most profit in the game of The Seventh Empire.

Each star is given a fresh Trade Index each turn. A number of factors come into the calculation. Let's consider one star:

1) The total number of fleets leaving the star on Trade missions on both phases of the turn is the number of Buyers.

2) The total number of fleets arriving at the star on Trade missions on both phases of the turn is the number of Sellers.
3) Each star already has a Trade Value by virtue of its star type.
4) Trade Index = Trade Value × Buyers ÷ Sellers.

The trade index is used when calculating the profit to be made on a Trade mission. Trading from star A to star B:
PROFIT = TRADE INDEX B — TRADE INDEX A.

If you go from a star with a low Trade Index to a star with a higher Trade Index, you make a profit. If you do it the other way round, you make a loss! (see example.)

Gateway trade **(Cargo)** does not influence the Trade Index and profits on this are calculated differently. You can still do ordinary Trade with a gateway star, however.

On each turn, an overall Raid Penalty is announced. It is used in calculating losses due to damage during a raid on an alien empire's star. It varies according to the number of players in the game, we will announce it each issue.

BATTLE ORDERS

Battles will be rare each game turn, but some obvious targets will present themselves each month. And, if successful, these can change the galactic map.

A fleet travelling from its empire to a warring empire can be given an Attack or Raid order. If an Attack order is given on the first movement phase, no subsequent order can be given to that fleet.

A fleet can only be given an Attack order on its second movement phase if it stayed in its own empire on the first phase. In both cases the Attack mode of movement is used. Fleets on Attack orders stay at the star they attack (see example).

The result of an Attack is calculated as follows:
1) Defending ships = number of owning empire's ships at end of turn.
2) Attacking ships = number of alien ships from all empires there on Attack orders from both movement phases.
3) The defender's ships are compared with the attacker's ships. Whoever has the most, wins. In the cases of a draw, the defender wins.

All the fleets of all the attackers and the defenders become the fleets of the victor. Any fleets from the losing empires lose all their profits. Fleets on the victor's side gain an additional Battle Bonus.

FLEET ACTION

As well as moving between stars, a fleet is also given an Action order. These are as follows:-
Move — no action, just movement.
Trade — taking goods from one star to another.
Raid — plundering an alien empire's star.
Return — returning from a raid to own empire's star.
Attack — moving to an enemy empire's star for battle.

There are also the following actions which can take place when using the Gateway Mode of movement:-

tween two stars. No profit or loss will be made. Move orders cannot be given to a fleet travelling between two stars of empires at war.

A fleet travelling from a star of its own empire to the star of an alien empire can be given **Raid** orders. It must use the Attack Mode of movement and the Raid order **must** be given on the first phase of movement. On the second phase of movement the player **must** give a **Return** order to the ship, in which it must go to a star belonging to its own empire.

Profits are calculated as follows:-
T = Trade Index of raided star.
F = Fleets at raided star at end of turn.
R = Raid Penalty.
Profit = T − (F × R)

FUNUS ♡ 13 808	LULIP ♦ 79 400	YANOK ♡ 48 458
VEPOZ ♡ 68 600	QATOT 0 16 600	HEZOD * 72 112

Fig. 1

Fig. 2

	1st Movement phase DESTINATION	ACTION	2nd Movement phase DESTINATION	ACTION
FLEET 4 AT: Lulip	Qatot	Raid	Lulip	Return

In the example above are six star systems. These are six stars in close proximity whose solar systems are capable of supporting life in such quantity that the system is considered a trade centre.

The **Hezod** system in Fig 1. is a **Gateway** star represented by the asterisk in the centre. The 72 number represents 72 fleets currently based on planets in the system and the Trade Index is 112 for this turn.

Funus and **Vepoz** are both **Elixir** stars (represented by the heart symbol) so no trade can take place when a ship moves between them. In travel mode it is possible to move between **Hezod** and **Funus**. The first movement phase will take your fleet to **Lulip**. And then onto **Funus** in the second movement phase.

Funus, Lulip, Yanok and **Hezod** are all in the Bloodline Empire. If a ship at **Funus** wants to attack **Qatot** (Water Empire) it must travel in **Attack Mode**. It cannot go diagonally, so must pass through **Lulip** first. Even though **Vepoz** is in the Dead Empire and this is currently at peace with the Bloodliners, that empire will not allow an attacking Bloodline vessel to pass through its system on the way to attack **Qatot**. If a **Lulip** fleet wishes to **Raid Qatot**, it's first order will be DESTINATION: Qatot. ACTION: Raid. Its second movement phase will consist of DESTINATION: Lulip. ACTION: Return. (figure 2).

Qatot has an Energy star trade value of 100. 12 of the 16 ships which are there this turn are Buyers and only two ships left to sell. So the Trade Index for Qatot this turn is 100×12÷2 600. But a ship arriving from Vepoz which also has a trade value of 600, will not make any profit on the trip as 600−600=0.

Jump — no action, just movement.
Cargo — taking special goods on a particular route.
Plunder — piracy on any ships on the same route.

Trade orders can be given to any fleet moving in Travel mode between two stars. The profit made by this action is calculated by subtracting the trade index of the star the ship is leaving from the trade index it is going to. For example, going from A to B:-
Profit = Trade Index B —Trade Index A

Trade orders cannot be given to a fleet travelling between two stars of empires at war, nor can they be given to a ship travelling between stars of the same type.

Move orders can be given to any fleet moving in Travel mode be-

Return orders can only and must be given to a fleet which has just made a raid. It is like a Move order, carrying no profit, but it must be made on the second phase of movement and movement must be in Attack Mode. It must also be made to a star of the same empire as the star the fleet started its turn at (see example).

Battles can either profit the defender or the attacker. Fleets on the losing side lose all profits. Victors gain an additional bonus.
Bonus = Losers' total profits/number of winner's fleets.

The Battle Bonus will be noted for each turn in the Battle Reports section.

If an attacker wins then each fleet profits as follows:-
Profit = Trade Index of star attacked + Battle Bonus

A **Stay** order is just that, staying at a planet. Any illegal order will be changed to a stay order and no profit gained.

Stay orders have no effect on trade or profits but may effect battle.

GATEWAYS

A fleet moving in Gateway Mode between two stars can be given **Cargo** orders. This order has nothing to do with the normal Trade Index of the Gateway Stars. The profit is calculated as follows:-
Profit = 1000/Sqr (number of fleets using same trade route).

If the route a fleet is taking is Plundered all profits are lost.

With **Jump** orders no profit or loss is made — it simply moves!

A fleet moving in Gateway Mode between two stars can be given **Plunder** orders. If any other fleets are trading on the same route they lose all their profits. If no ships are trading on the same route then the Plundering fleet gets no profit. Any profit from piracy is calculated as follows:-
Profit = total traders' profit/number of pirates on route

The **Gateway Route Table** is a reference guide to the profits made by taking a particular gateway-gateway route. The star of departure is given by the row and the star of destination is given by the column. Cross-referencing these, you will find the box corresponding to travel between those two stars in that particular direction. This is the gateway route. The box will show one of two things:-
(1) Black figures on white background = Gateway Trade Profit — no pirates on route.
(2) White figures on black background = Pirate Profit — the profit each pirate on the route makes. Traders get no profit.

Each empire is run by vast computers, crossing the galaxy in huge ships which react to the data the tribes put into them. They are invulnerable and, if at a star, that star cannot be taken in battle. They do not trade, battle or raid and can never end their turn in an alien empire's system.

Any fleet ending its turn at the same star as an Imperial Ship will have its profits doubled.

The richest player in each empire takes control of the imperial ships that turn. But there is one condition, the only players considered are ones whose fleets all belong to that empire.

GAMES NEWS

SAVE THE FINAL FEW HUMANOIDS

ABDUCTOR

The aliens are out to capture the last six remaining humanoids on planet X and it is your task to stop them.

They swirl down towards you looping-the-loop — like bugs hovering around a lamp shade — and then swoop down and grab one of the humanoids.

The humanoid is then carried dangling from the alien craft up towards the top of the screen where he comes to a sticky end. The aliens having extracted all the vital organs for experimental purposes then toss the skull down towards the planet's surface.

The aliens attack in five waves. If you manage to survive to the fifth wave you are awarded an extra gun — which you will need as the aliens multiply in numbers and also become much faster and difficult to shoot.

When the last humanoid has been abducted that marks the end of the human race so you are charged with a weighty task.

Abductor runs on an unexpanded Vic-20 and is the latest addition to the Llamasoft range of software for the Commodore machine.

It sells at £6.00 inclusive from the Hampshire-based firm.



MISSION TO FIND THE GATEWAY . . .

TIME GATE

A four dimensional game is the manufacturer's proud boast on the cover of this latest space game for the Spectrum.

Your mission is to travel back through time to destroy the enemy before they hatch their evil plot of intergalactic tyranny.

The game displays the view from the cockpit as your ship hurtles through space past stars, planets, galaxies and ultimately towards the Time Gate.

Once through this you can attempt to shoot the aliens who appear momentarily in front of you.

You are armed with photon torpedoes which you must fire at the aliens to destroy them.

The ship is equipped with impressive flight and battle control computers.

Short range radar enables you to train your photon torpedoes accurately on the aliens.

Long range radar shows you the number of aliens in any given galaxy and their positions.

There is also a jump drive which enables you to race through time.

The game comes complete with a keyboard overlay to simplify the playing buttons on the computer.

The ships computer records the level of damage sustained and the number of aliens downed. There is a lot to concentrate on so only experienced space pilots need apply.

Time Gate is the latest game from Quicksilva of Southampton. It runs on a Sinclair Spectrum in 48K and costs £6.95.

IMPROVING YOUR TUNNEL VISION . . .

3D TUNNEL

3D Tunnel is the latest offering from 3D expert Malcolm Evans, the man behind 3D Monster and 3D Defender — the J. K. Greye games that have sold more than thirty-thousand tapes between them.

The 3D effect is created by a sequence of ever decreasing squares which your craft passes through, creating the effect of depth as the squares appear to disappear into the distance on your screen.

As you pass through the tunnel a number of adversaries will attempt to stop you. You will have to deal with rats, bats, rabbits and even an express train hurtling towards you from the depths of the tunnel.

You can shoot these obstacles or try to dodge them.

3D Tunnel runs on a Sinclair Spectrum in 48K or 16K and is available from New Generation Software of Bristol at £5.95.

THIS COULD BE A REAL BOA!

SNAKES

Snakes introduces you to a wriggling maze of the colourful but deadly creatures. You are in control of a grinning blob and using this you must outwit seven menacing snakes which wriggle and twist around the screen.

At the start of the game, the screen is filled with tiny eggs which your blob must consume to score points. The snakes are walled in by lines of eggs but these are soon consumed by the red snake thus releasing the other snakes.

The action is now fast and furious as the snakes chase after you hungry for a nice juicy blob. When all the eggs have been consumed phase two of the game commences.

Now it is the turn of the blob to get its revenge as it can now eat the snakes. To do this it must land on a snake's tail from whence it will chomp its way along the entire length of the snake to gain 200 points.

The blob is moved using either a joystick or the keyboard.

Snakes runs on an unexpanded Vic-20 and is the latest addition to the Postern range of games. It is available from the Cheltenham-based company at £6.99.

THE ACTION PACKED PACKAGE!

GAMES PACK 2

Three games for under a fiver is this latest value-for-money package offered for the ZX81.

The games are all action packed — City Bomb places you on a bombing raid over a deserted city with the mission to destroy as much of it as possible.

3D Battle places you at the cockpit of Starblazer Cruiser hurtling through space at the speed of light. You are attacked by alien death ships which are spinning towards you intent on your destruction.

Gridball is a two player type tennis game — with both players operating their players with the keypad control keys. The cassette is available from JRS Software of Worthing at £4.95.



GAMES NEWS



COME FLY FASTER WITH US!

ASTRO CHASE

Astro Chase adds a number of new features to the space war type game.

You are the astronaut aboard an inter-galactic spacecraft and the aliens are attacking.

But they are not just attacking from the space immediately around your planet but from throughout the entire universe.

This greater distance necessitates the simulation of greater flight distances created by the innovation of something called Single Thrust Propulsion. This enable the ship to fly fast over great distances whilst still able to manoeuvre and fire at the attackers.

Astro Chase is a recently imported game from the U.S. for the Atari 400 or 800. It is sold in this country by Gemini Electronics of Manchester at £19.95.

Also new from Gemini this month is a 3D driving game called Baja Buggies.

You are driving across the desert steering to avoid the oncoming traffic.

The road weaves its way across the yellow sand as the sun blazes away in the sea blue sky. The screen also displays the speedometer.

The game requires 16K of memory and costs £19.95.

JOIN BILBO ON HIS DRAGON HUNT

THE HOBBIT

The Hobbit — J.R.R. Tolkien's masterwork of imagination and lyrical prose has been converted to the computer.

Your mission is to seek out the evil Dragon and return the treasure he hoards back home.

As a secondary concern, you must look after Thorin the Dwarf and protect him. Should he be killed during the adventure, it is most unlikely you will be able to survive the dangers ahead of you.

You will meet many of your favourite characters from the book including Gandalf, Thorin, Gollum, the Elves, and many others. Each of these characters has the ability to make decisions, interact, and communicate not only with the player but also with the other characters.

The program is part graphic part Adventure game.

The Hobbit runs on a Sinclair Spectrum in 48K. It comes complete with a full colour instruction manual and a copy of the book, *The Hobbit*.

The package is available at £14.95 from Melbourne House publishers of Leighton Buzzard.

WHAT A LOAD OF RUBBISH!

TRASHMAN

Trashman is the latest variation on the Pacman theme featuring giant flies, garbage and you as the unfortunate dustman with the job of clearing up all the mess.

You are a trash collector scouring the city streets to pick up the various garbage which is represented on the screen as a series of dots.

There are a number of added dangers for your dustman to be aware of. A super-breed of giant flies have sprung up feeding on the debris. These flies have grown to man eating proportions and are beginning to change their diet to include the local population as well as the garbage.

To fight the flies the council have invested in a fleet of remote control garbage collectors in the hope of removing the flies diet of garbage.

There are also six green trash cans placed around the city streets. If you pick up one of these the flies are temporarily weakened and you can run them over with your trash truck. But you will have to be quick as the flies are not weakened for long.

Occasionally a bit of bonus rubbish appears at the centre of the screen for which you can earn bonus points if you manage to pick it up.

Trashman is the new cartridge game from Audiogenic for the Vic-20. It is available at £19.95 from the Reading based firm or from any Vic dealer.



DR. DEATH MEETS MR BOND

SHAKEN NOT STIRRED

Secret agent 007 comes to the screen of your computer.

The game kicks off in true Bond style with an action packed scene in which a jet carrying a nuclear missile is stolen by the baddies. Your mission is to locate the missile and neutralise it.

The game introduces the evil Doctor Death who is holding the world to ransom.

The missile is hidden in a three dimensional maze in Doctor Death's under water lair.

The maze is patrolled by Paws who is Doctor Death's top henchman.

With sheer luck or Bond — like professionalism you may reach the missile control room. All you have to do now is crack the secret code.

Shaken but not Stirred runs on Sinclair Spectrum in 48K and costs £6.50 from Richard Shepherd Software of Maidenhead.

MISSION TO DESTROY THE DEATH STAR

SPACE WAR

There is a strong flavour of Star Wars in this latest game for the new Dragon computer.

You are at the controls of the sole-surviving star fighter on a mission to penetrate the Death Star defences and destroy it.

Enemy fighters are circling the Death Star and may blast you with their torpedoes at any time.

It is not only enemy fighters you have to worry about. There is also a black hole with a strong gravitational pull.

The space around the Death Star is littered with invisible space mines which can only be detected by listening carefully for a sonic alert which they will emit before they explode.

Space War is available from Microdeal of Bodmin, Cornwall, at £8.00.

Illustrations: Jon Davis

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GAMES NEWS

METAL MEN OUT FOR YOUR BLOOD!

ROBOT

Robot is the blood sport of the future. You are the human prey in this cruel entertainment.

You are pursued around an arena by a killer robot. If the robot catches up with you you are viciously done to death by being jumped on by three tons of mechanical gladiator.

The robot is also armed with a plasma gun which will not kill you outright with the first shot but weakens and slows you down. If you suffer more than a few shots it's all over.

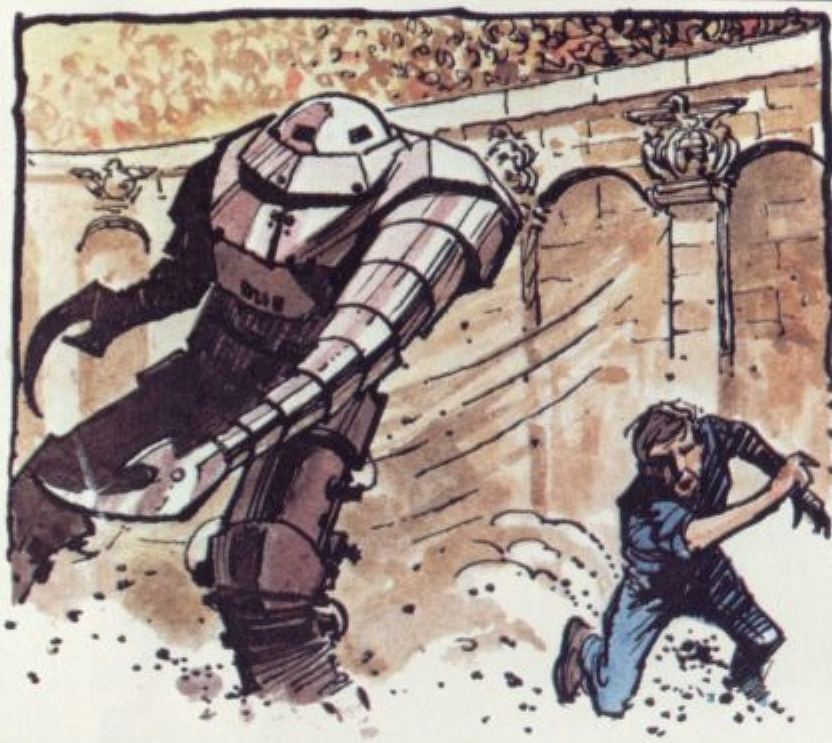
In order to avoid a messy death you must reach the robot's remote control box situated in the bottom right hand corner of the arena and switch it off.

If you manage to do this you can open the door of the arena and stride out a free man.

Just to make things a little more interesting for the spectators and a little more dangerous for you the arena is covered with several hidden mines which will blow you or the robot to bits if you put a foot in the wrong place.

Robot runs on a BBC Model B and is available from Bournemouth based Viking Software at £4.95.

Also new from Viking this month for the BBC Model B is an action space game called Spacefight, a breakout type game called Break-Up and a two player game called Skwosh which will run on a Model A. The games cost £3.95.



PROWLING THE MEAN STREETS . . .

DEADLINE

Deadline is the latest crime solving mystery game to be imported from the U.S.

The package comes as a complete dossier of a crime committed on the 7th July 1982 when the wealthy industrialist Marshall Robner died of an overdose of Ebullion — an anti-depression drug he had been taking for some time. But was it suicide or was it murder?

That's for you to work out and you have only twelve hours to do it.

You get a brown folder containing all the documentary evidence. This includes the Coroners report, a large black and white photograph of the scene of death with a white chalk line showing the position and outline of where the body had been found, a letter from Mr Marshall's Attorneys, the Inspectors casebook complete with excerpts from an interview with Mrs Robner, some fingerprints and an official memo, a lab report, and even samples of the tablets which were the cause of death.

Deadline became the number one best selling Apple game when it was released in the States in July.

The game is available in this country from Lancashire based Pete and Pam Computers. It runs on an Apple II and costs £39.25.

HOT TIME IN THE OLD TOWN TONIGHT!

FIREBIRD

A firebird is flying across the city setting fire to buildings and terrorising a defenceless populace.

You play the part of a fireman trying to extinguish the flames and rescue the inhabitants of blazing tenements.

In order to rescue the unfortunate victims of the bird from another world you have to climb a ladder to where the trapped people are screaming for help.

The game comes on cartridge for the Atari 400 and 800 and retails at £29.95. It is available from Manchester-based Gemini Electronics.

FAMOUS FIVE BREAK OUT FOR BBC

GALAXIANS

Five new arcade favourites have recently been launched by a new software house manufacturing exclusively for the BBC Model B.

A Galaxians cassette is on offer featuring four types of Galaxian swooping down individually or in groups of two or three.

The game features six skill levels, with a hi-score recorder which ranks in numerical order the various high scores of the session.

Bonus bases are awarded for higher scores although the game gets increasingly difficult — just as in the arcade game.

Space Fighter is a hybrid combining some of the best features of the arcade classics Scramble and Defender.

A souped-up version of Space Invaders is offered with a few extra features thrown in to add interest. The flying saucers for example drop powerful bombs which wreak untold havoc on your laser bases.

Centipede is also offered featuring many features of the arcade version — mushrooms, snails, flies, spiders, and the centipede itself.

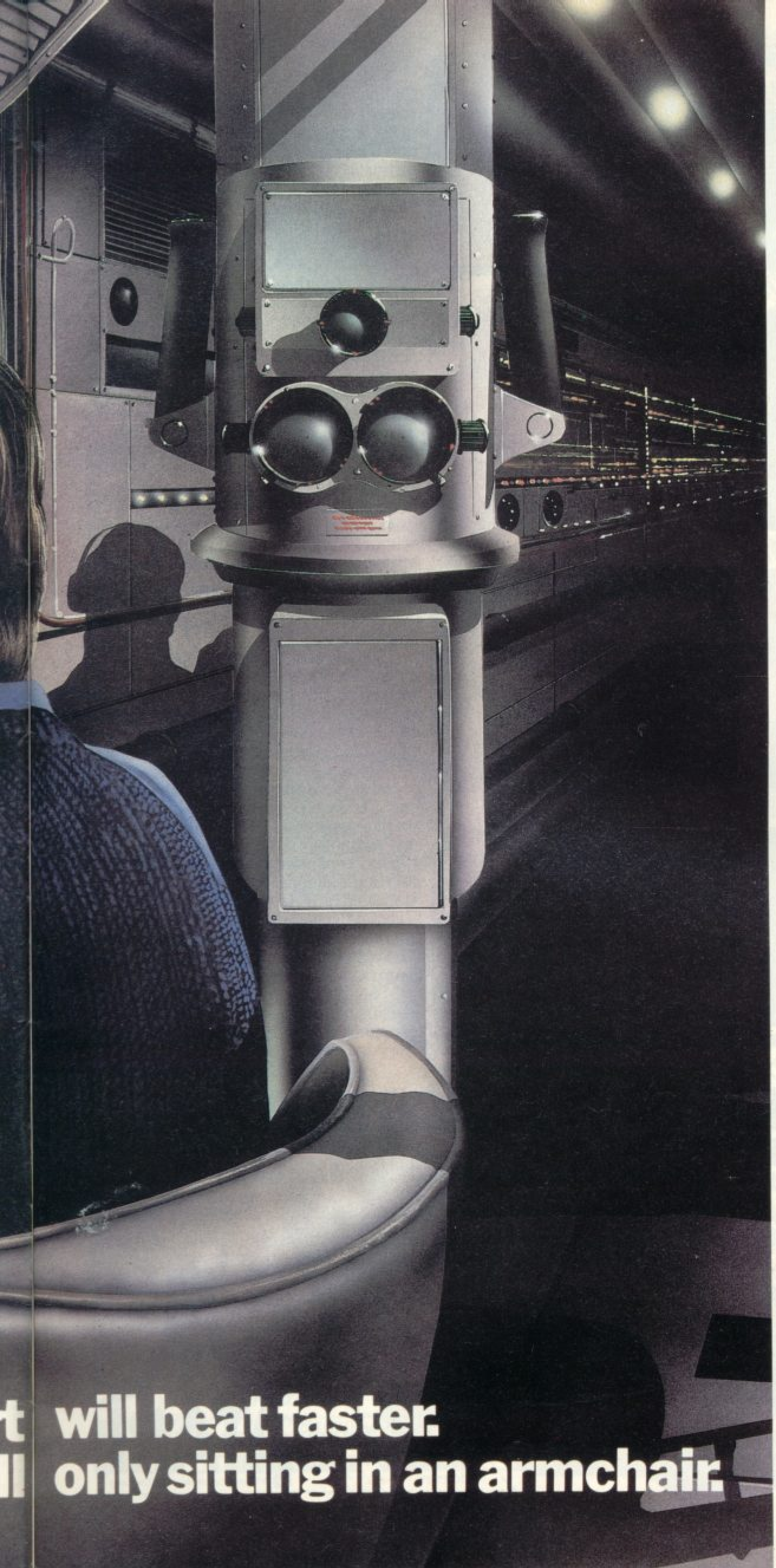
The games all run on the BBC Model B and cost £6.50 each or £5.50 each when you order two or more cassettes.

They are available from new Leeds-based firm, Superior Software.



Illustrations: Jon Davis


Your hands will sweat. Your heart
Your oxygen might run out. And you're still



At seventy fathoms the only light comes from your Sonar, steadily tracking the advancing enemy fleet.

Suddenly they're above, dropping depth charges. You could dive. But how close is the sea bed? You could attack. But how many torpedos are left? And your oxygen. Isn't it dangerously low?



Submarine Commander. 12 K ROM. Cartridge. 3 screen modes: map, sonar and periscope. 9 skill levels. Controls: Fuel. Damage Indicators. Speed. Compass Bearing. Depth Gauge. Battery Charge. Oxygen. Hydrophone/Engine Noise. Attitude. Clock. Depth below keel. Torpedos. Tonnage Sunk.

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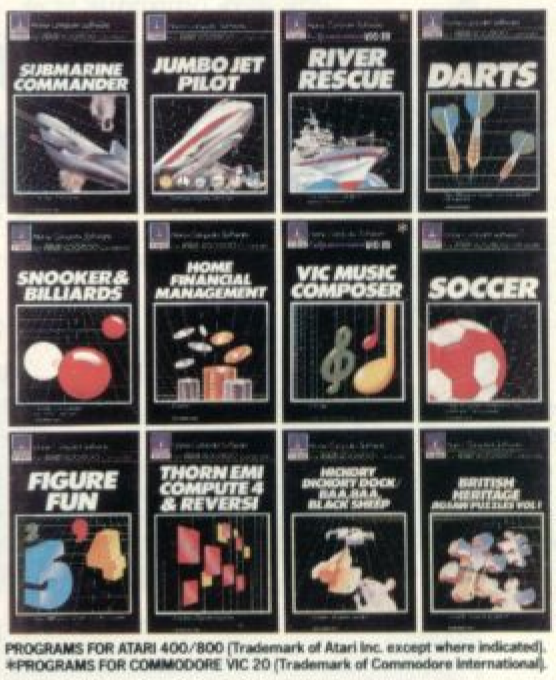
But our programs aren't all work and no play. 'River Rescue', 'Kickback' and 'Soccer' are all-action games. 'Pool' and 'Darts' will suit armchair sportsmen.

And whilst budding Beethovens play the 'VIC Music Composer,' would-be Chancellors can work on their budgets with 'Home Financial Management.' We also have educational puzzles for children that will puzzle adults at higher skill levels.

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HE'S TRYING A LOOP WATCH THIS CLOSELY SNAG. THIS COULD BE VERY EDUCATIONAL.
TIPPY! TAP!
LOGIC CIRCUITS
BINARY SNAKES
CHIP
WHEEEE!!
NOW THAT'S WHAT I CALL A LOOP!
WOW! TOTAL ANIMATION COMMANDS. THIS SHOULD BE SOMETHING
OH NO! I'D PROGRAMMED IT FOR A LONGER TABLE!

VIC-20

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CASSETTE 2

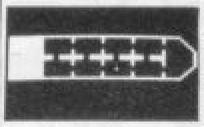
Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette 2 costs £5.

CASSETTE 3

8 programs for 16k ZX81

STARSHIP TROJAN



Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photo torpedo tracking.

PRINCESS OF KRAAL
An adventure game.

BATTLE Strategy game for 1 to 4 players.

KALABRIASZ World's silliest card game, full of pointless complicated rules.

CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.

SECRET MESSAGES This message coding program is very txlp qexi jf.

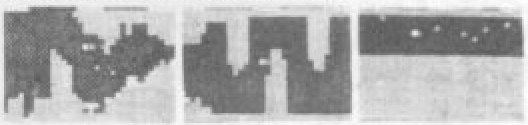
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.

Cassette 3 costs £5.

CASSETTE 4

8 games for 16k

ZX-SCRAMBLE (machine code)

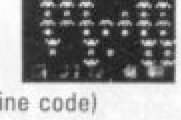


Bomb and shoot your way through the fortified caves.

GUNFIGHT (machine code)



INVADERS (machine code)



FUNGALOIDS (machine code)

GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft.

SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed (very fast at top speed)

LIFE (machine code)
A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. It is very hard to beat the computer at it.

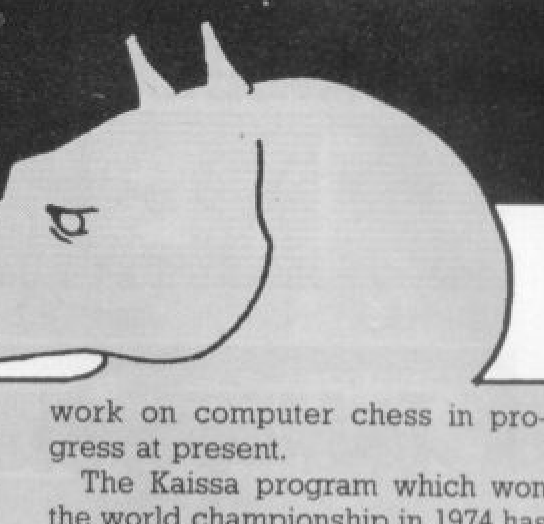
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman).

Cassette 4 costs £5.

Recorded on quality cassettes, sent by first class post, from:
Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

SPECTRUM SOFTWARE WANTED

CHESS



GOING BY THE BOOK . . .

I have described Ken Thompson's invention BELLE in previous articles. It (or she?) is a special-purpose machine built solely for playing chess, and won the third world Computer Chess Championship held at Linz two years ago with a score of 4½/5.

The development speed of BELLE is as impressive as its subsequent results. The initial design was in February 1980 at which point its components (1,700 chips) were ordered. BELLE's first move was made in July 1980 and only two months later it won the world championship!

The machine generates a candidate move in just over one two-millionth of a second and can examine 160,000 positions per second.

The opening "book" comprises 300,000 positions (compared with an estimated 200,000 positions in each volume of the Encyclopaedia of Chess Openings. The entire book is scanned in one and a half seconds.

BELLE's official rating is now around 2150, but improving its performance further is prohibitively difficult.

It is remarkable that the philosophy behind BELLE (fast and extensive searching of variations) is the exact opposite to that adopted by Mikhail Botvinnik, who as well as being a computer chess researcher for many years was three times world (human) champion.

His conference talk (see panel) on "Decision making and computers" stressed the important of examining only a small number of positions at each turn — preferably only one — and to restrict the analysis for each move to approximately 50-60 — well chosen — positions in all.

Only by this means, in Botvinnik's view, can master play be achieved. Botvinnik's program "Pioneer" has been a long time in development but may well be a major advance when it appears. Sadly it seems that there is virtually no other USSR work on computer chess in progress at present.

The Kaissa program which won the world championship in 1974 has not been developed much since.

Although some of the conference papers are far from simple for the uninitiated to understand, *Advances in Computer Chess, 3* and the two earlier volumes, published by Edinburgh University Press, are the best available works for the serious student of the topic.

The next conference is due in 1984. Will computers have reached master level by then?

To conclude, here is a game played on the evening of the conference between Danny Kopec — a U.S. Master and former Scottish champion — and BCP, a good example of a well-developed and relatively strong program.

Danny Kopec was playing BCP and an early version of BELLE — 30 times slower than the current one — simultaneously.

As well as a hobby and a game, computer chess has long served as a vehicle for serious research in computer science, especially the branch known as *artificial intelligence* which is largely concerned with the methods by which people solve problems requiring complex reasoning.

There has even been a series of academic conferences on the subject and the papers from the most recent one are soon to appear in book form under the title *Advances in Computer Chess, 3* to be published by Pergamon Press and edited, as before, by Michael Clarke, a researcher at Queen Mary College, London.

The conference itself was held last Easter at Imperial College, London and attracted delegates from nine countries as well as speakers from no fewer than seven.

The first two conference talks were by Ivan Bratko, a Yugoslavian, and Don Beal from Queen Mary College who have been independently investigating the question "why are valuations of positions based on deep analysis more reliable than "static" ones made without any analysis?"

This seems obvious (and if it were not so, most chess playing programs are carrying out a vast amount of calculation for nothing), but it is tantalisingly difficult to answer precisely. At last, an explanation (or, at least, a partial one) has been found and is given in the book.

Other theoretical papers at the conference dealt with different aspects of searching trees of variations, forms of automatic learning, long-range positional planning, measuring the "information" contained in a chess position, and psychological experiments on both people and machines.

Two of the most interesting papers at the conference were presented by Ken Thomson, of Bell Laboratories, and Mikhail Botvinnik who was making a rare visit to Britain from the USSR.

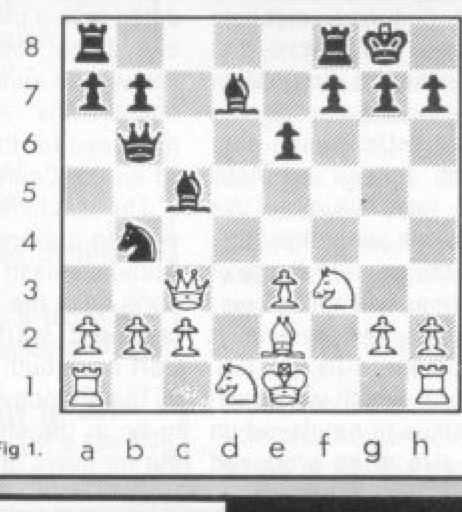


Fig 1.

BCP (White) versus D. Kopec (Black)

1. P-K4, P-K3; 2. P-Q4, P-QB4;
The "Franco-Sicilian" defence. Black's strategic aim is "to confuse White" and he succeeds. BCP is now out of the book.
3. N-KB3, P×P; 4. Q×P
An attempt at originality.
4.... N-QB3; 5. Q-Q3, B-B4; 6. N-B3, N-B3; 7. B-KB4, Q-N3; 8. N-Q1, P-Q4; 9. P × P, N × P- 10. B-K3, N × B; 11. P × N, B-Q2. Black is now well ahead on development.
12. B-K2, N-N5; 13. Q-B3? 0-0; (Fig 1.)
White is lost, Black threatens 14. . . . N×QRP immediately. White's Queen Bishop Pawn is vulnerable and a Knight move to Q4 is also dangerous.
14. N-K5, B-R5; 15. B-Q3,
White's only possible counterplay is 15. N-QB4.
15..., N-Q4;
Overlooking 15. . . . N × QBPch.
16. Q-B4, Q-R4ch; 17. P-B3, QR-B1;
18. Q-R4, P-B4;
A typical computer game. White is totally lost but keeps finding counterplay
19. N-B4, Q-B2; 20. P-QN3, B-K1; 21. P-R4, N × KP;
22. N(B4) × N, B × N; 23. N × B, Q × BPch; 24. K-K2, Q-N7ch;
25. N-B2?, R × Nch; 26. B × R, Q × Bch; 27. K-KB1, B-B3;
28. Q-N5, P-KB5!; 29. R-K1, P-B6
and Don Beal resigned for his program.

BY MAX BRAMER

VIDEO SCREEN

E.T. MEETS THE F.B.I.

E.T.

All I want to do is get home. That's poor old ET's lament in the latest Steven Spielberg blockbuster in which the friendly alien from outer space does his best to get back to his family and friends.

Trouble is every time ET tries to do just that those 'Earthling Aliens' conspire to stop him.

The man from the FBI tries to lock him up for the protection of the good citizens of the US.

The scientist wants to get him back to his laboratory to carry out all sorts of gruesome experiments.

ET soon finds that the only person he can trust on the inhospitable planet Earth is schoolboy Eliot.

Now you can become ET's friend and help him get home in this latest game from Atari for the VCS.

The idea of the game is to find the three pieces of ET's interplanetary telephone and then call up his ship to come and rescue him.

Whilst conducting your search, manoeuvring ET around the screen using the joystick, you can also pick up pieces of candy which appear periodically in the centre of the screen.

As well as earning you extra points these pieces of candy are also vital in helping you locate the third section of the telephone.

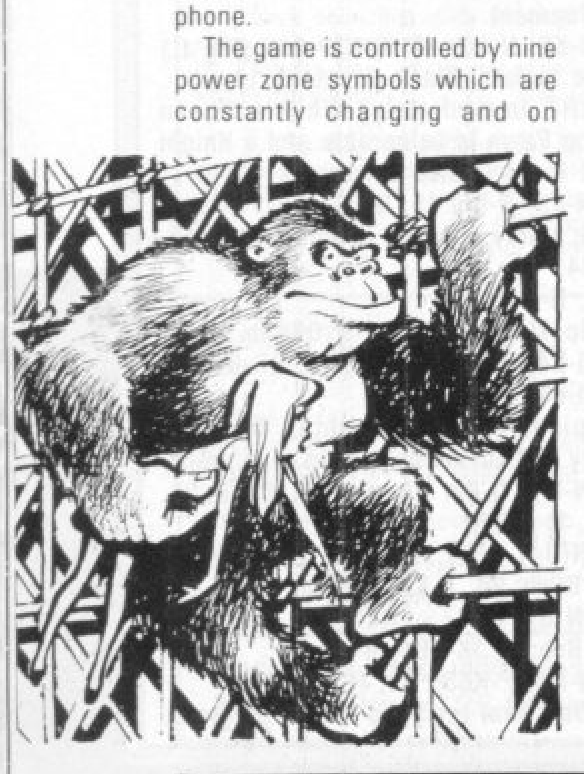
The game is controlled by nine power zone symbols which are constantly changing and on which you must keep a sharp eye as they dictate what you can and cannot do at any given stage in the game.

The game has three difficulty levels. The simplest of these features just ET and his little friend Eliot searching for the various bits of the telephone.

Game two introduces the government agent who is trying to arrest ET and chases him.

For really skilled players level three introduces another baddie to deal with in the shape of a scientist who will haul ET back to his laboratory.

ET will be in the shops before Christmas to coincide with the film going on general release. It costs £29.95.





SECRETS OF SYSTEM X

ATARI 5200

The long awaited successor to Atari's successful VCS machine is about to be released in the US.

The 5200 will be in the shops in the U.S. this Christmas at around the £150 mark Dubbed System X when prototypes were shown to journalists the machine has 48K of computer memory enabling it to produce "state of the art" graphics.

The aim was to produce video games to be played on a domestic TV set of the same high quality as the coin operated games of the arcades, and according to out sources, the first wave of games, which includes Pacman and Centipede, do have the fine graphic detail one associates with the pay-per-play devices.

Before Atari owners start rushing out to the shops to enquire about this new machine there are two drawbacks that must be mentioned first. Most importantly Atari have so far said nothing about a UK launch date for the 5200. Indeed an Atari spokesman told *C&VG*: "We don't want to talk about that yet".

Secondly the present range of Atari VCS games will not be compatible with the new system. It has been rumoured in the U.S. that an adaptor which would enable VCS games to be played on the 5200 is also to be produced but this has so far not been confirmed.

If there is some uncertainty about when Atari will launch their new machine in the U.K. there is no doubt about the debut of another exciting video games system from America — the Colecovision.

The graphics are not only more detailed than conventional systems but they are also capable of producing more onscreen movement, greatly enhancing the playability of the popular space-battle genre of video games.

Coleco have insured the system against obsolescence in the fast moving video games market by making it capable of being up dated with a planned programme of add-ons. The first of these add ons will be an adaptor which will enable any existing cartridge produced for the VCS to be played on the Colecovision.

The machine will be launched with an exciting range of games. Arcade smash hits like Donkey Kong (with the manic gorilla, and captured starlet), Zaxxon and Gorf have both been converted.

The Colecovision is expected to be in the shops by next April but no news on price yet.

WHO'S NOT A PRETTY BOY THEN!

SPACE VULTURES

Space Vultures are a vicious breed of birdlike aliens who can fly through space without the aid of space ship. They will attack any old planet that takes their fancy on their strange intergalactic migration.

Nobody seems to know where they are going, or for what purpose, but then it does not really matter to you — the lone pilot of the sole remaining planetary Defender Ship.

Your duty is clear. Shoot down the aliens before they shoot you and colonise your planet for their evil bird-like overlords.

The vultures attack in groups of three, hovering around the screen and then homing in on your space ship.

You are armed with an energy shield which will protect you for a few seconds, enabling you to survive a head-on collision with the aliens and shrug off their laser fire.

If you survive the first wave of Vultures you are then challenged by the super birds who are several times the size of their predecessors and who attack in waves of three.

These superior adversaries take more than one direct hit to finish off. They swoop down straight towards your ship bombarding you with missiles. You will need to shoot fast and accurately to down them before they down you.

One drawback that Defender Ship pilots very quickly have to come to terms with is the slowness of the ship's missiles. They jerk very awkwardly skywards.

Despite this the Vultures are still pretty easy to deal with. This particular Defender Ship pilot managed to shoot down wave after wave of them on his second go.

Space Vultures is the latest game for the new Hanimex HMG 2650. The game is available from Hanimex stockists at approximately £20.

VIDEO SCREEN

BRIGHT NEW YEAR FOR VIDEO FANS

GAMES CENTRES

Every other TV commercial these days seems to be advertising either video games centres or extra cartridges to go with them.

One spin off from this hotting up of competition is that prices in the high street shops are beginning to fall.

The Interton VC400 can now be snapped up for less than £50 which includes a free Space Invaders cartridge. The price of additional cartridges for this machine are also down in price.

It is as well to issue a word of warning about this machine however. Hanimex have recently introduced a new machine to replace the Interton — the HMG 2650. There will therefore be no new games for the Interton once current supplies have sold out.

Not that only machines which are being phased out are falling in price. Phillips have recently announced that they will be chopping £30 off the price of their G7000 to help them compete with Atari in the Christmas shopping spree. New price £70.

Mattel is tight lipped on the subject of price cuts to their Intellivision machine which is now selling for £159. It is unlikely that they will be able to maintain this price for too much longer. Many of the dealers have already felt it necessary to lop £20 off this price. Even at £139 the machine is competing not only with other TV games-centres but with half a dozen micro-computers many with superior graphics and a wider and cheaper range of games available.

Even Atari, who currently head the field with sales of their VCS, will find it difficult to resist a price cut in the new year as the prices of micro computers looks set to tumble.

The price of cartridges too is likely to come down more in line with prices in the U.S. where games cartridges are roughly a third of the price they sell for in the U.K.

So although it is not an option open to Father Christmas the wise buyer may do better by saving his money until the Spring.

DOWN THE CORRIDOR OF DANGER

INFILTRATE

You are a secret agent on a mission to infiltrate a top secret fortress.

Armed with a powerful laser gun you can shoot the mechanical guards of the fortress who are chasing you. You can also duck down by pulling back the joystick to crouch beneath the guards' lasers.

The screen shows five corridors, one on top of the other, with six connecting lifts.

The idea of the game is to get your little man to the highest corridor and then safely back down again.

Precision timing is needed to judge just the right split second to jump on one of the lifts which pump up and down automatically like pistons in a steam engine.

Once on a lift you have to watch carefully for the positions of the mechanical guards as a blast of laser fire is their usual greeting to anything unexpected emerging from a different floor level.

Infiltrate can be played by one or two players and is the latest addition to the Apollo range of games for the Atari VCS.

Also new from Apollo for the pre-Christmas shopping rush is a nail-biting traffic control game called Final Approach.

This is your chance to suffer the tension in a simulation of one of the world's most high pressured jobs.

Planes are taking off and landing at an international airport. It is your job to see that the incoming traffic gets down safely without colliding with countless outgoing flights. Sounds easy? Just you give it a try. And remember many of the world's most serious air disasters have been traced back to air traffic control blunders and that the average air traffic controller retires with an ulcer before the age of 40!

Also new this month on the Apollo label is a slightly less serious game called Wabbit.

You are an honest hard-working farmer trying to protect your crops from a family of thieving rabbits who live in a series of burrows in your carrot field.

Every time their big ears pop up from one of the holes you throw one of your rotten eggs at them in an attempt to stink them out of their honeycombed hide out.

The Apollo range of games are imported into this country from the US by Vulcan Electronics of London. They are currently in the shops at £24.95.

	MACHINE	NAME	MANUFACTURER
1	Intellivision	Dungeons and Dragons	Mattel
2	Intellivision	Sub Hunt	Mattel
3	Atari	Defender	Atari
4	Intellivision	Night Stalker	Mattel
5	Atari	Starmaster	Activision
6	Intellivision	Lock 'n' Chase	Mattel
7	Atari	Berzerk	Atari
8	Atari	PacMan	Atari
9	Intellivision	Utopia	Mattel
10	Atari	Frogger	Parker

The above top ten represents the sales of cartridges during the month of October.

The dominance of Mattel games as being due to a backlog of delayed releases in that month. People bought a number of Mattel titles they had been waiting for for some time.

The retailers are expecting the November chart to show a completely changed picture. Watch out for next month's top ten. Will your favourite be in the charts?



Illustrations: Terry Rogers

PENGO IS REALLY COOL!

It is possible to judge your addiction to an arcade game by how far you will travel to play it. For one more game of Pengo I would willingly travel to the Antartic wastes in which it is set.

Four lucky members of the C&VG team have so far tried out this cutest of coin-operarated video games and their verdict is unanimous . . . Pengo is the C&VG tip for 1983.

First read-on and then go and pester your local arcade owner to get hold of a Pengo machine.

Brrrr! Deep in the confines of the frosty blue maze Pengo is pushing his way out of trouble.

His flippers may not be much good for flying but they sure pack a punch on the Antartic ice-rink he knows as home.

This frozen wasteland is made up of a random maze constructed out of blue ice blocks. Pengo starts in the centre and the villains of the piece, the sno-bees, set off from the corners.

The sno-bees' sting is deadly and Pengo is helpless in any bee-to-beak confrontation, but this flightless sea-fowl can move the ice-blocks around with a hefty push. And woe betide any sno-bee who gets caught behind a block.

PENGO

That is the essence of the game, Pengo must wipe out each swarm of sno-bees before they can run him to ground.

Each screenful of sno-bees consists of some which become instantly active and others disguised as ice blocks. These can be pecked to death by Pengo before they "wake up".

Unlike the Pacman ghosts, sno-bees are somewhat haphazard in their pursuit although one will occassionally give dogged chase to Pengo.

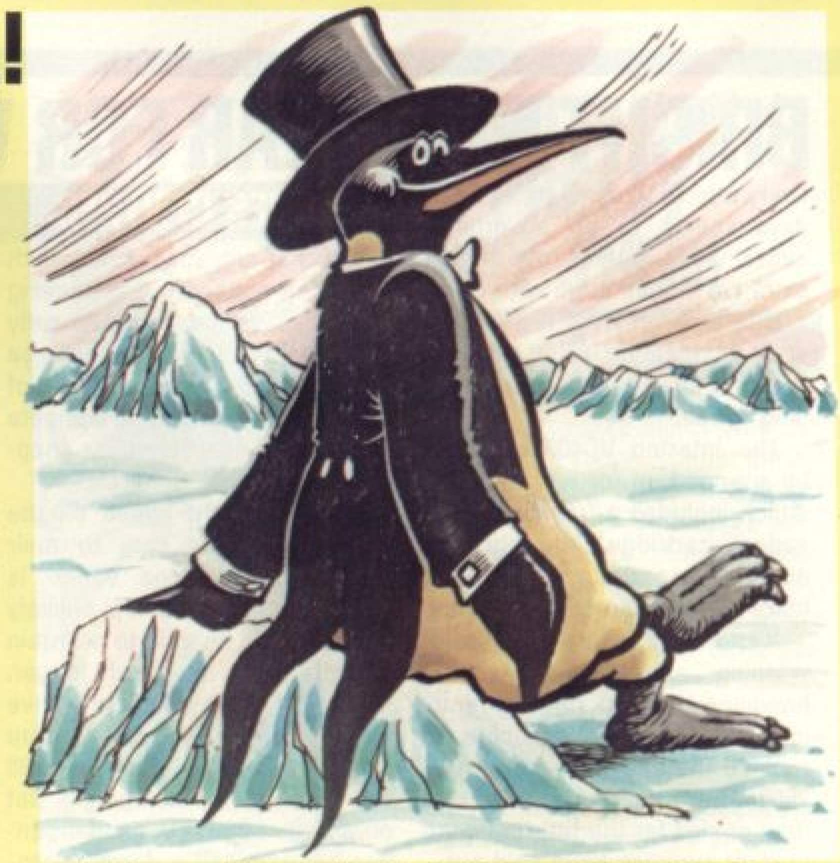
But while not unduly aggressive, these cute little villains can usually spot a waiting penguin a mile off and will try to approach on the wrong side of the ice block, thus robbing Pengo of his ammunition.

They are helped in this by their ability to chisel through the ice-blocks and Pengo shares this ability when he needs to get out of a tight corner.

There is a lot more to this game, like making the sno-bees dizzy and scoring big bonuses by squashing two with one block or using the indestructible blocks.

Pengo is a game apart, with wonderful graphics, delightful characterisation, plenty of scope to work out your own tactics and a catchy melody.

But if there's one over-riding reason why Pengo will take off, it's down to that feeling of satisfaction you get when an ice-block picks up speed and knocks all the wind out of a surprised sno-bee!



THE SUICIDAL STOCKBROKER

WALL STREET CRASH

The great Wall Street crash is happening all over again.

As fire chief it's your job to catch the suicidal stock brokers as they try to end it all in one final desperate leap.

Once safely pouched in a safety blanket the danger is not over as they must be bounced into a waiting ambulance. A good player will manage it in two bounces, a beginner may well see his stockbroker bouncing off screen or just straight up again.

And the Dow Jones Index is falling all the time. Each broker who reaches an ambulance helps light up the bank and six will enable you to move onto the next stage of the game.

This is a long maze where money bags have been hidden. These must be collected and deposited in a safe. Tanks chase you through the maze.

The action continues in these modes alternately with more tanks and more brokers being added. By the time you reach three suicidal stock marketeers, a helicopter has appeared and it is possible to achieve a bonus by shooting a saved broker skywards into it.

BURGERS HAVE YOU IN A PICKLE

Burger time is the fast food game to keep a budding chef on his toes.

Picture the scene: the eggs, sausages and pickles are revolting in the kitchens.

You take the part of a chef, whose only hope is to trap your edible enemies in the burgers you are busy making.

A series of burger bridges are constructed among the platforms and ladders which make up your kitchen. Every time you run across a burger, piece of bun, cheese, tomato or lettuce, it drops closer to the dish the complete burger should end up on.

As you run across the piece of cheese, for example, it drops down a level, sending whatever lay below it, down too. Gradually a complete burger is built up, but a good player will add eggs, sausages and pickles to that burger by catching these items of food between layers.

BURGER TIME

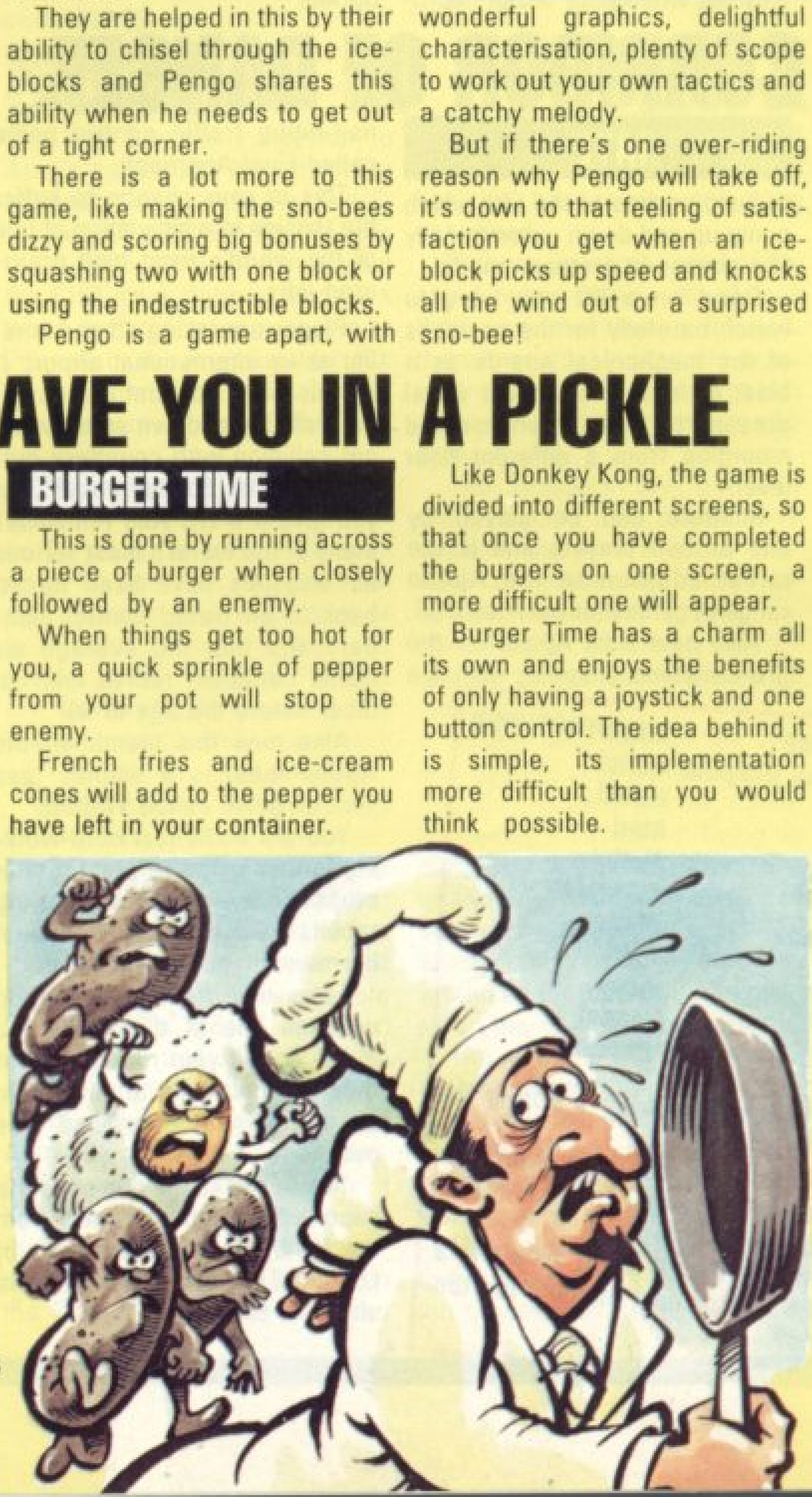
This is done by running across a piece of burger when closely followed by an enemy.

When things get too hot for you, a quick sprinkle of pepper from your pot will stop the enemy.

French fries and ice-cream cones will add to the pepper you have left in your container.

Like Donkey Kong, the game is divided into different screens, so that once you have completed the burgers on one screen, a more difficult one will appear.

Burger Time has a charm all its own and enjoys the benefits of only having a joystick and one button control. The idea behind it is simple, its implementation more difficult than you would think possible.



Illustrations: Terry Rogers

ACTION

ON THE ROAD TO RUIN ON THE MOON

MOON PATROL

The moon's surface is an inhospitable place, pitted with craters and also boasting an atmosphere heaving with aliens.

In Moon Patrol a moon buggy is your responsibility as it traverses a lunar landscape across the screen.

You are armed with a fire button and a jump stick to overcome most of the hazards that come your way.

The aliens hovering above your craft are the main source of danger in this game.

By pushing your fire button you can launch a missile skywards to try and bring them down.

But take care to avoid the bombs they are dropping moonwards to bring about your destruction.

Their bombs may also leave dangerous pits in the moon surface and these have to be noted and duly jumped.

The alien attackers take on three forms, there are obstacles across the surface which have to be blown up. Land mines, erupting volcanoes and low-flying planes add to the tension.

If you survive the beginners' course there is a champion course waiting to challenge you.

Moon Patrol is a simple game with easy to tackle controls and an obvious game objective, but it is not among the best of the recent batch.





SOMETHING NASTY IN THE GARDEN

DIG-DUG TIPS

The Dig-Dug score clock turns over at 999,990 but that needn't be the limit for a dedicated player.

Although this score seems beyond belief to a beginner, it is really just a matter of knowing the short cuts.

Beginners tunnel their way up to a monster (either a fire-breathing Fygar or a less dangerous Pooka), fire their pump gun, pump the creature to death and then move onto the next victim.

Using this technique it is possible to clear round after round but it has several disadvantages: it stops being effective at the higher rounds; it is very time consuming; it generates far less points as the fruit is not always recovered.

A better technique is to find your wav beneath a rock, wait for some monsters, squash them, tunnel through to the next rock, squash some more, grab the fruit And then finish off the monsters.

Try and reach the rock before the ringing noise sounds as this releases the monsters.

Should monsters block you off from the next rock there is a technique for killing them.

After dropping the first rock tunnel yourself close to the main tunnel but not actually breaking through into it. Two millimetres is enough to use your pump on passing monsters who cannot get your man. Always approach the tunnel horizontally as more points accrue from monsters tackled this way. When only two monsters remain move to the next rock, use it, thus making the fruit appear; grab it and finish off the final monster.

Fygars killed horizontally are worth double points and another way to bump up the points is to pump monsters in the lower areas of the screen.

It is divided into four horizontal layers. Points scored for a monster depend on which area he is finished off in. For example, a Pooka is worth 500 points if he is killed in the bottom layer.

When pumping a monster, push towards them as this will inflate them faster.

A tip for rock tunnelling is to leave a notch below the horizontal entrance to the vertical tunnel. This notch will ensure that no monsters escape.

Nuneaton Dig-Dug champion, Tooba Zaidi, who compiled these tips for us, offers some other information for top players: most rounds that can be displayed are 99; if you squash all eight monsters a 15,000 point bonus is achieved and after the 32nd round any successful pattern you devise will work for the next 50 rounds at least.



Grab your bicycle clips and head for your nearest arcade — Bally's BMX is heading your way! This latest pinball from the American giant is based on the new cycling craze, bicycle motocross.

BMX continues Bally's return to the table that requires quite a lot of skill to master it. BMX features two levels and colour-coded targets — like the recently released Spectrum. There's also a mysterious magnetic device on the top level.

A novel feature of this novel machine are the devices which save a ball which finds its way down the chute. There a two additional buttons alongside those which control the flippers and these work two "shields" which catch the lost ball and send it back into play — but you can only use them just so often!

THE VIDEO WIZARDS

The latest casualty of improving arcade scores is Atari's Centipede. Three players have now come forward to reach 999,999 and I gather that it is possible to go well over the clock on this machine — and so it seems time to close this file down.

Only one contender for turning the clock over at Dig-Dug though. Tooba Zaidi, who wrote the tips is our highest scorer here. Tooba also claims top spot on the Tempest machine. Still awaiting scores on: Space Dungeon and Robotron.

TEMPEST
945,481
Tooba Zaidi
SCRAMBLE
912,160
Andrew Winup
GORF
886,430
Gary Miller
FROGGER
116,150
Richard George
DIG-DUG
999,990
Tooba Zaidi
DONKEY-KONG
428,300
John Bull
QIX
263,820
Sarabjit Singh
CRUSH ROLLER
471,530
Alan Dowler
AMIDAR
74,330
R. J. Arundale
HYPERBALL
1,448,060
Nick Strakings
PHEONIX
409,630
John Danvers
PACMAN
1,050,900
Tim Haywood

Illustrations: Terry Rogers

Perhaps it's just the rhythmic "plink" of the sonar bouncing off the enemy hull, or maybe that tomblike silence which adds to the tension between depth charge blasts but submarine films always have that much more atmosphere than any other war movies.

Sub Hunter lets you partake in the thrill of an underwater naval battle ... but luckily for the claustrophobic, your role is acted out above the Briny.

The submarines may be running silent and deep but your mission is to seek them out and blow 'em up.

Your helicopter hovers above the waves, while the enemy uses them to dodge and hide from your bombs.

The submarines are not alone though.

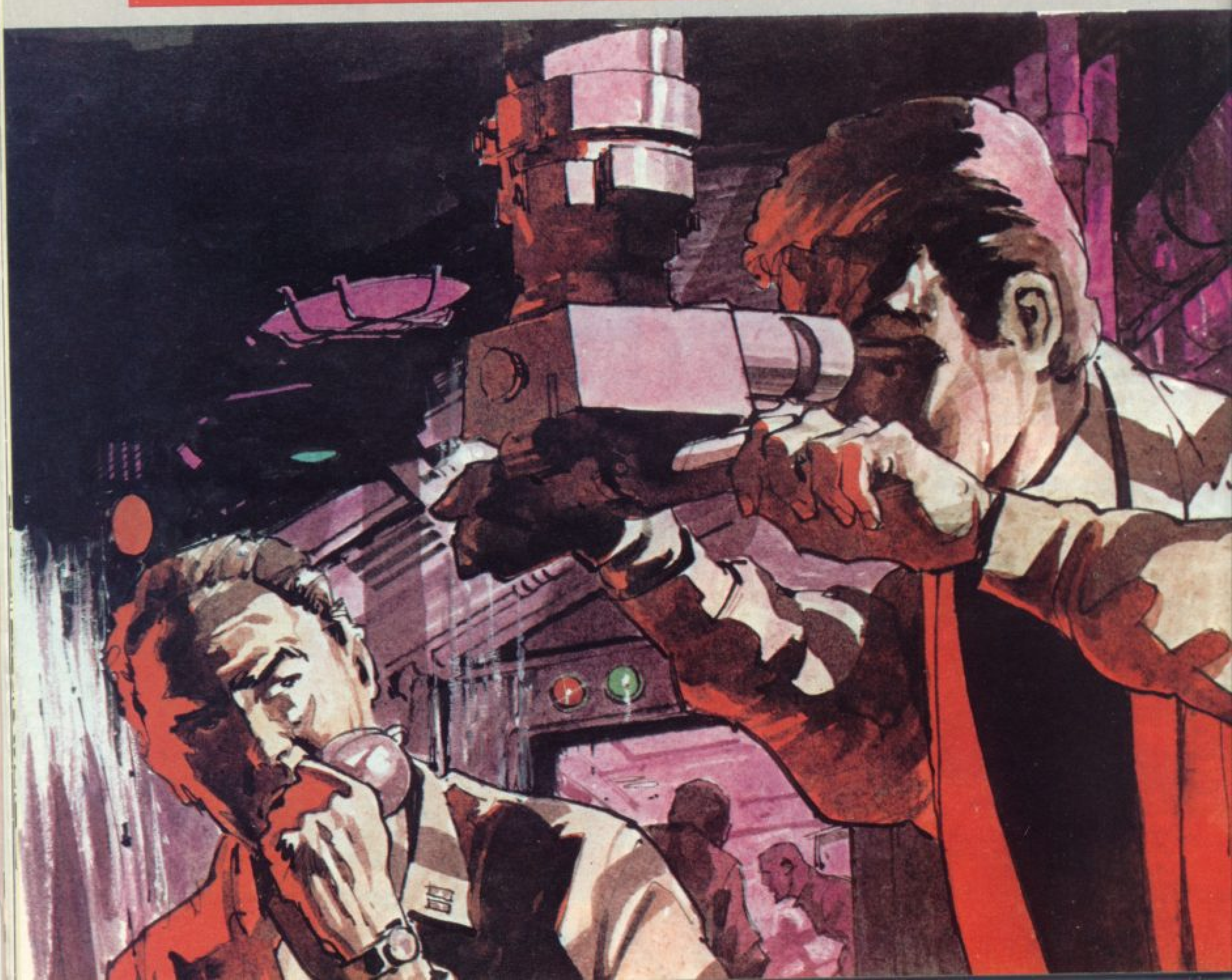
A fleet of destroyers is on hand to give covering fire and try to blast you out of the sky.

Points are scored for successful bombing of destroyers and for the destruction of the enemy subs.

RUNS ON AN ATARI 400 IN 16K

SUBMARINE HUNTER

BY HUGH DENHOLM



```
10 GOTO 8800
2098 REM **JOYSTICK CONTROL **
2099 REM ** FOR HELICOPTER **
2100 S=STICK(0)
2102 GOSUB 6000
2103 GOSUB 7000
2104 IF STRIG(0)=0 THEN 5000
2105 IF S=15 THEN 2100
2110 T=0:D=0
2120 T=(S=5)+(S=7)+(S=6)-(S=10)-(S=11)-(S=9)
2130 D=(S=5)+(S=9)+(S=13)-(S=6)-(S=14)-(S=10)
2140 IF T=0 THEN 2170
2142 IF T=1 THEN 2150
2145 GOTO 2160
2150 X=X+4:POKE 53251,X:IF X>=250 THEN X=250
2155 GOTO 2170
2160 X=X-3:POKE 53251,X:IF X<8 THEN X=8
2170 IF D=0 THEN 2100
2172 IF D=1 THEN 2179
2175 GOTO 2199
2179 IF Y=40 THEN 2100
2180 FOR I=7 TO 0 STEP -1:POKE PMBASE+896+Y+I,PEEK(PMBASE+895+Y+I):NEXT I
2190 Y=Y+1
2195 GOTO 2100
2199 IF Y=4 THEN 2100
2200 FOR I=0 TO 7:POKE PMBASE+895+Y+I,PEEK(PMBASE+896+Y+I):NEXT I
2210 Y=Y-1
2220 GOTO 2100
4999 REM **HELICOPTER MISSILE CONTROL**
5000 R=Y+5:SS=X+3:POKE PMBASE+384+R,192:POKE 53255,SS
5005 MSL=MSL-1:GOSUB 7800
5010 R=R+1:M=PEEK(53251)
5015 GOSUB 6000:GOSUB 7000
5020 IF R>=95 OR SS<5 OR SS>226 OR M=2 OR M=3 OR PEEK(53279)=3 THEN GOSUB 7600:G
OTO 2105
5030 POKE PMBASE+383+R,0:POKE PMBASE+384+R,192:SOUND 3,50+(Y+R)/2,10,8
5040 IF STICK(0)=7 THEN SS=SS+1:POKE 53255,SS
5050 IF STICK(0)=11 THEN SS=SS-1:POKE 53255,SS
5060 POKE 53255,SS
5070 GOTO 5010
5999 REM **SUBMARINE CONTROL**
6000 E=E+1
6010 J=PEEK(53259):IF E<1 THEN E=0
6020 IF E>185 THEN GOTO 6100
6030 POKE 53249,E:IF J=10 THEN HITS=HITS+1:GOSUB 7600:GOTO 6060
6040 K=K+1:IF K>=20-MSL THEN POKE 623,2:FOR A=1 TO 10:NEXT A:POKE 623,4:K=0
6050 RETURN
6060 FOR A=250 TO 100 STEP -1:SOUND 0,200,8,A/17:NEXT A:SOUND 0,0,0,0:E=0
6070 GOSUB 7800
6080 RETURN
6100 POKE 623,2:FOR A=1 TO 50:POKE 705,14:SOUND 2,50,10,8:SOUND 0,75,10,8:NEXT A
6110 SOUND 2,0,0,0:SOUND 0,0,0,0:POKE 705,88:E=0:HOME=HOME+1:GOSUB 7800:RETURN
6999 REM **DESTROYER MOVEMENT**
7000 IF J=12 THEN M=2:DST=DST+1:GOSUB 7350:GOSUB 7600:GOTO 7030
7010 Q=Q-1:IF Q=0 THEN Q=180
7012 COLOR 0:XX=INT(RND(0)*130):PLOT XX,59:COLOR 3:XX=INT(RND(0)*130):PLOT XX,59
7015 GOTO 7200
7020 POKE 53250,Q:RETURN
7030 FOR R=71 TO 75
7040 SOUND 0,220,12,6:FOR A=5 TO 0 STEP -1:POKE PMBASE+768+R+A,PEEK(PMBASE+767+R
+A):NEXT A
7050 FOR CT=1 TO 50:NEXT CT
7060 NEXT R
7070 Q=180:POKE 53250,Q:SOUND 0,0,0,0
7080 FOR R=75 TO 71 STEP -1
7090 FOR A=0 TO 6:POKE PMBASE+767+R+A,PEEK(PMBASE+768+R+A):NEXT A
7100 NEXT R
7105 GOSUB 7800
7110 RETURN
7199 REM **DESTROYER MISSILES**
7200 IF FIRE=1 THEN 7240
```

Illustration: Jon Davis

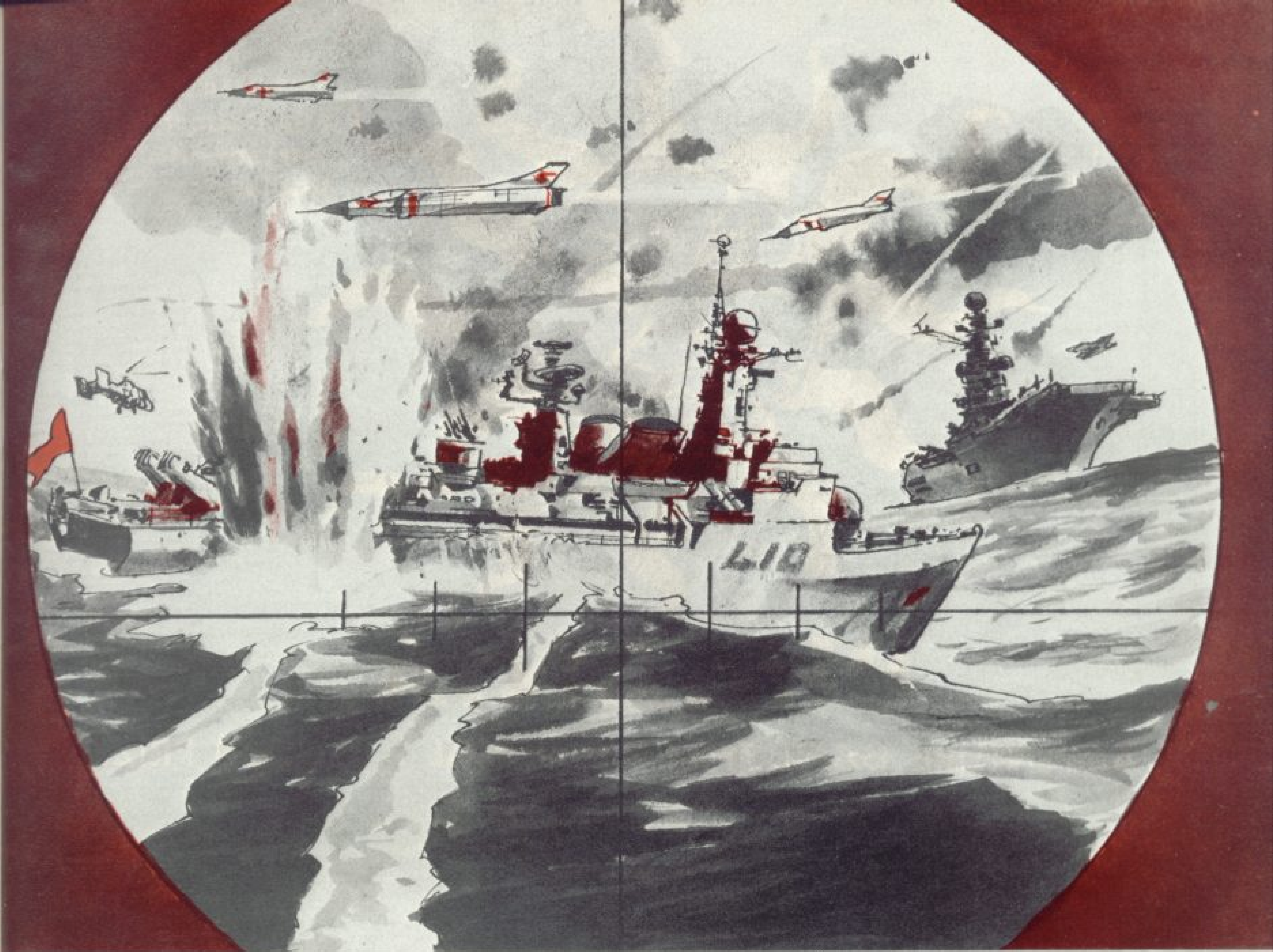


Illustration: Jon Davis

```
7210 IF Q>150 OR Q<40 THEN 7020
7220 GO=RND(0)*100:IF GO>95 THEN FIRE=1:GOTO 7240
7230 GOTO 7020
7240 IF START=1 THEN 7260
7250 START=1:U=Q:V=68
7260 POKE PMBASE+384+V,0
7270 IF X>U THEN U=U+RND(0)
7280 IF X<U THEN U=U-1-(U-X)/80
7290 V=V-1:IF V+10<Y OR V=0 OR U=0 OR U=255 THEN GOSUB 7350
7300 HIT=PEEK(53258):IF HIT>0 THEN GOSUB 7350:GOSUB 7500
7305 IF START=0 THEN GOTO 7020
7307 SOUND 3,V,10,7
7310 POKE PMBASE+384+V,48:POKE 53254,U
7320 GOTO 7020
7349 REM **DESTROYER MISSILE END**
7350 FIRE=0:START=0:POKE 53254,0:POKE PMBASE+384+V,0:SOUND 3,0,0,0
7355 POKE 77,0
7360 GOTO 7020
7499 REM **CLEAR HELICOPTER**
7500 GOSUB 7600:M=3
7505 FOR A=1 TO 50:POKE 707,0:POKE 707,14:SOUND 0,200,8,15:NEXT A
7510 SOUND 0,0,0,0:POKE 707,54:X=45:POKE 53251,X
7520 MSL=20:HEL=HEL-1:IF HEL=0 THEN GOSUB 7350:GOSUB 7800:GOTO 8000
7530 GOSUB 7800
7599 REM ** HELICOPTER MISSILE END **
7600 SOUND 3,0,0,0:POKE 53278,0:POKE 53255,0:POKE PMBASE+383+R,0:R=95
7620 IF MSL=0 THEN 7510
7630 RETURN
7799 REM **PRINT SCORE**
7800 POKE 752,1
7810 PTS=(HITS*250)-(HOME*50)+(DST*100)
```

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```
7850 ? "SUBS DESTROYED      ";:? HITS;:? " HELICOPTERS ";:? HEL
7855 ? "SUBS HOME           ";:? HOME;:? " MISSILES     ";:? MSL
7860 ? "DESTROYERS SUNK ";:? DST;:? " POINTS        ";:? PTS
7870 RETURN
8000 RESTORE
8002 POKE 53277,0:POKE 53248,0:POKE 53249,0:POKE 53250,0:POKE 53251,0
8005 GRAPHICS 2+16
8010 ? #6;" ":? #6;" ":? #6;"       THE END":? #6;" "
8015 FOR A=1 TO 200:NEXT A:GRAPHICS 2+16
8020 ? #6;"YOU SANK ";:? #6;DST:? #6;"      DESTROYERS"
8030 ? #6;"YOU BLEW UP ";:? #6;HITS:? #6;"      SUBMARINES"
8040 ? #6;"AND SCORED ";:? #6;PTS:? #6;"      POINTS"
8050 ? #6;" "
8060 IF PTS<2000 THEN 8070
8061 IF PTS<8000 THEN 8080
8062 IF PTS<15000 THEN 8090
8063 ? #6;"perfect!!! well done":GOTO 8095
8070 ? #6;"perhaps you had the joystick upside down":GOTO 8095
8080 ? #6;" not bad! try again":GOTO 8095
8090 ? #6;"     very good"
8095 ? #6;"PRESS START TO PLAY       AGAIN"
8100 IF PEEK(53279)<>6 THEN 8100
8110 GOTO 10
8800 GRAPHICS 2+16:POSITION 0,4:? #6;"  submarine hunter":POSITION 0,6:? #6;"
BY HUGH DENHOLM"
8810 POSITION 0,10:? #6;"press start to begin"
8850 IF PEEK(53279)<>6 THEN 8850
8900 REM **ESTABLISH BACKGROUND**
8901 REM **AND PLAYERS**
8905 GRAPHICS 7
8910 COLOR 1:SETCOLOR 0,0,15:SETCOLOR 4,9,10
8920 PLOT 35,10:DRAWTO 38,10:PLOT 33,11:DRAWTO 40,11:PLOT 32,12:DRAWTO 42,12
8930 PLOT 30,13:DRAWTO 43,13:PLOT 29,14:DRAWTO 45,14:PLOT 27,15:DRAWTO 48,15
8935 PLOT 28,16:DRAWTO 47,16:PLOT 29,17:DRAWTO 45,17:PLOT 31,18:DRAWTO 44,18
8940 PLOT 33,19:DRAWTO 42,19:PLOT 34,20:DRAWTO 41,20:PLOT 36,21:DRAWTO 40,21
8945 PLOT 97,2:DRAWTO 101,2:PLOT 95,3:DRAWTO 102,3:PLOT 93,4:DRAWTO 103,4:PLOT 9
2,5:DRAWTO 104,5
8950 PLOT 91,6:DRAWTO 107,6:PLOT 90,7:DRAWTO 111,7:PLOT 90,8:DRAWTO 113,8:PLOT 8
9,9:DRAWTO 114,9
8960 PLOT 90,10:DRAWTO 115,10:PLOT 90,11:DRAWTO 115,11:PLOT 91,12:DRAWTO 114,12:
PLOT 92,13:DRAWTO 113,13
8970 PLOT 93,14:DRAWTO 112,14:PLOT 93,15:DRAWTO 111,15:PLOT 95,16:DRAWTO 109,16:
PLOT 97,17:DRAWTO 107,17
8975 PLOT 72,20:DRAWTO 75,20:PLOT 70,21:DRAWTO 76,21:PLOT 68,22:DRAWTO 78,22:PLO
T 67,23:DRAWTO 79,23
8980 PLOT 68,24:DRAWTO 78,24:PLOT 69,25:DRAWTO 76,25:PLOT 71,26:DRAWTO 75,26:PLO
T 72,27:DRAWTO 74,27
9010 COLOR 3:SETCOLOR 2,8,4
9020 FOR Y=60 TO 79:PLOT 0,Y:DRAWTO 159,Y:NEXT Y
9030 FOR CT=1 TO 80:XX=INT(RND(0)*160):PLOT XX,59:NEXT CT
9035 COLOR 2:SETCOLOR 1,12,10:FOR YY=58 TO 70:PLOT 130,YY:DRAWTO 159,YY:NEXT YY
9037 FOR YY=71 TO 79:PLOT 157,YY:DRAWTO 159,YY:NEXT YY:PLOT 0,79:DRAWTO 159,79
9040 YY=57:FOR XX=130 TO 159:L=RND(0)*2:YY=YY-L:PLOT XX,57:DRAWTO XX,YY:NEXT XX
9042 HEL=3:MSL=20:HITS=0:HOME=0:DST=0
9045 POKE 752,1:? :? "PLEASE WAIT WHILE I BUILD YOUR":? "      HELICOPTER"
9050 POKE 623,4
9055 POKE 559,46:POKE 707,52
9060 X=47:Y=5:E=0:Q=180
9070 A=PEEK(106)-24:POKE 54279,A:PMBASE=256*A
9080 FOR B=PMBASE+384 TO PMBASE+1024:POKE B,0:NEXT B:POKE 53277,3
9090 FOR B=PMBASE+896+Y TO PMBASE+902+Y:READ A:POKE B,A:NEXT B
9100 DATA 127,8,190,251,62,36,126
9110 POKE 53251,X
9120 FOR B=PMBASE+730 TO PMBASE+734:READ A:POKE B,A:NEXT B
9130 DATA 8,8,126,127,62
9140 POKE 53257,1:POKE 705,88:POKE 53249,E
9150 FOR B=PMBASE+839 TO PMBASE+843:READ A:POKE B,A:NEXT B
9160 DATA 16,58,255,127,62
9170 POKE 53258,1:POKE 53248,Q:POKE 706,2
9175 GOSUB 7800
9180 GOTO 2100
```

NIBBLERS

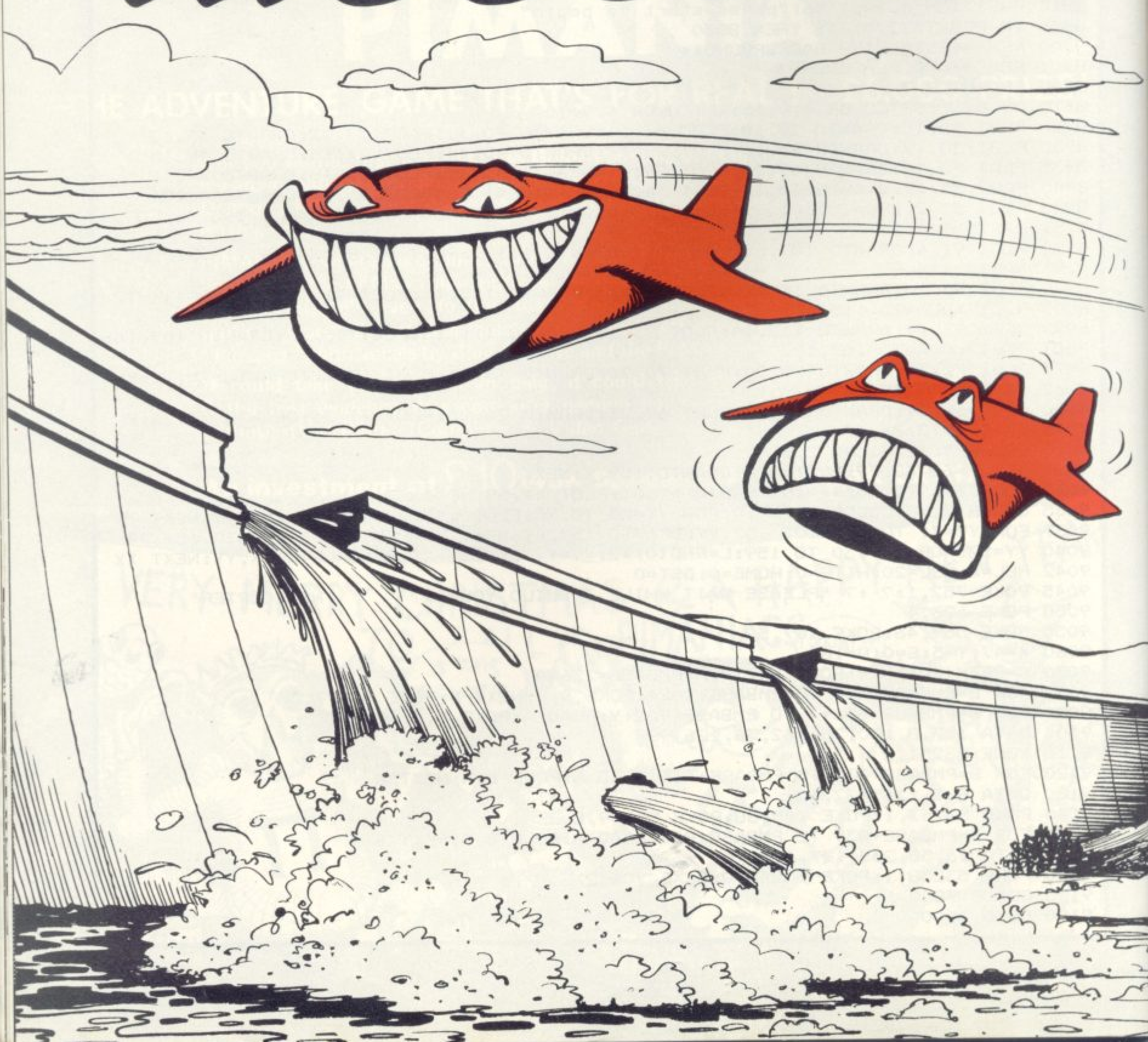
Some nasty alien dambusters are out to knock a big hole in your local dam and only you can stop them! The alien ships — code named Nibblers — can only be stopped by a well placed bomb from your fighter. If you miss the Nibbler will blast a bit out of the dam, weakening it. This is a game for one player adapted from Paul Jay's prizewinning program which won him the Computer and Video Games Program of the Year competition

The Nibbler appears on the right hand side of the screen and moves across towards the dam. To stop the Nibbler and launch your ship you hit the space bar. When you are directly above the nasty alien you press the space bar again to bomb.

If the computer has been expanded and so has extra memory you could use the user-definable graphics cabability of the Vic to improve the game. If so then the following routine should be added at the end of the program, and line 3 changed to:

```
3 PRINT CHR$(14): GOSUB 1000
1000 FOR I = 0 TO 1024
1010 POKE 5120 + I, PEEK (32768 + I): NEXT I
1020 FOR I = 0 TO 1024: READ A
1030 IF A = 1 THEN 1070
1040 POKE 6144 + I, A: NEXT
1050 DATA 56, 124, 230, 3, 3, 230, 124, 56
1060 DATA 24, 60, 102, 231, 166, 24, 35, 68
1070 POKE 36869, 253: POKE 36866, PEEK (36866) OR 128
1080 RETURN
```

If the above program is used then the pokes and peeks will have to be changed — 60 to 128 and 62 to 129.



RUNS ON AN UNEXPANDED VIC-20

ADAPTED FROM C&VG's

PROGRAM OF THE YEAR

```
1 REMCONCAT
2 PRINT"♥":O=-32
3 PRINTCHR$(14)
4 POKE36879,237:POKE36878,15
5 FORM=7680TO7701:POKEM,224:NEXT
6 FORM=7702TO8164STEP22:POKEM,224:POKEM+21,224:NEXT
7 FORM=8164TO8185:POKEM,224:NEXT
8 FORB=1TO5
9 POKE36875,200:POKE36876,0
10 FORL=1TO500:NEXT
15 PRINT"████████████████████/";:FORP=1TO200:NEXT
20 PRINT"\";:FORP=1TO200:NEXT
25 PRINT"|";:FORP=1TO200:NEXT
27 PRINT"|";:FORP=1TO200:NEXT
30 PRINT"L";:POKE36876,200:POKE36875,0:FORP=1TO200:NEXT
35 PRINT"‾";:FORP=1TO200:NEXT
40 PRINT"_";:FORP=1TO200:NEXT
50 PRINT"♥";:FORP=1TO200:NEXT
65 PRINT"██████████          ";:FORP=1TO200:NEXT
68 NEXT
69 POKE36879,25:POKE36876,0
70 PRINT"♥|HE OBJECT OF THE GAME"
80 PRINT"IS TO HIT THE /IBBLERS"
90 PRINT"BEFORE THEY DESTROY":PRINT
100 PRINT"THE DAM.":PRINT
110 PRINT"  |HE CONTROLS ARE:":PRINT
120 PRINT"♥PACE TO STOP /IBBLER":PRINT:PRINT"AND LAUNCH YOUR SHIP,":PRINT
130 PRINT"AND SPACE AGAIN TO":PRINT:PRINT"DROP YOUR BOMB.\F YOU "
131 PRINT"MISS YOU LOSE A POINT.":PRINT
140 PRINT" |IT A KEY TO CONTINUE"
150 GETA$:IFA$=""THEN150
151 POKE36879,191
155 PRINT"♥"
156 FORM=8164TO8185:POKEM,224:POKEM+30720,5:NEXT
159 REM**************          *CONSTRUCT DAM*          **************
165 V=12:POKE36878,15
170 A=0
180 FORB=7724TO8164STEP22
185 POKE36877,220:FORX=1TO5:NEXT:POKE36877,0
190 POKEA+B,224:POKEA+B+30720,6
200 NEXTB
210 A=A+1:IFA<2THEN180
220 FORA=0TO1
230 FORB=7726TO8167STEP22
235 POKE36877,220:FORX=1TO5:NEXT:POKE36877,0
240 POKEA+B,102:POKEA+B+30720,0
250 NEXTB
260 NEXTA
261 PRINT"█SCORE";S
262 TI$="000000"
263 PRINT"██████████████HIGH"O
264 REM**************          ****NIBBLER****          **************
270 A=INT(RND(1)*19)+1:D=7744:B$="":F=0
280 FORP=1TOA:D=D+22:NEXT
290 IF PEEK(D)<>102THENR=0:GOTO380
```





Illustration: Terry Rogers

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(DESIGNER — JEFF MINTER)

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This is VIC 20 cross breed between the now famed 'Packman' and the game 'Quix'. All in machine code, fast and fun with joystick controls, uses Hi-Res colour graphics. 8K or larger expansion needed. **Only £6.00 + 50p P&P complete with instructions.**

RATMAN! (8K EXPANSION)
Another amazing game from Llamasoft!! You are the man under attack by the deadly rats as they fall from the sky. You must dodge the arrows to get to the rats and then squash them with your hammer before they dig under the platform on which you stand, and mutate into devils. Fast action with great graphics to make an extremely addictive game. 8K or larger memory expansion needed. Hi-Res colour graphics, in machine code. **Only £5.00 + 50p P&P complete with instructions.**

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Unexpanded package a full feature version of the popular arcade Breakout plus a new concept in computer games, Deflex!! Both programs on one cassette **only £3.95.**

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As seen at the Commodore show and reviewed by the Daily Telegraph. Fly your Vulcan Bomber over the enemy city and destroy the buildings. 25 levels of play, uses Hi-Res colour graphics and plays Rule Britannia between waves. **Only £4.95 complete with instructions.**

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ZX81

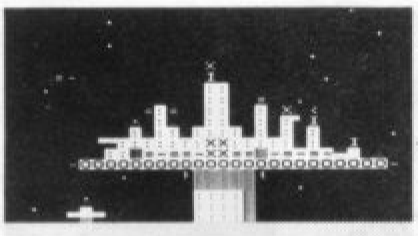
CENTIPEDE (16K)
the ORIGINAL game from the ORIGINAL author. This is the identical program to that being sold by other companies for three times our price. The game has received ecstatic reviews in the computing press. Program has 30 speed levels and ever increasing Centipede hordes. Tables top 10 scores and names. Why wait to pay more? **Only £1.95 + 50p P&P.**

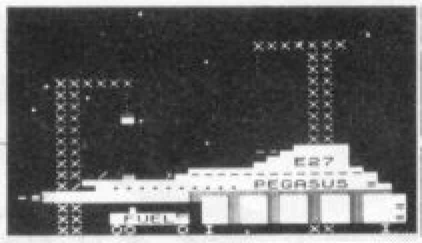
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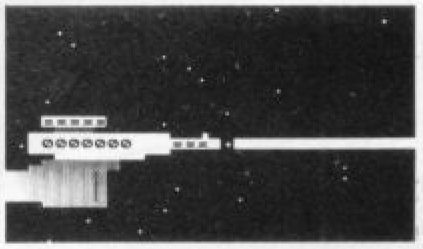
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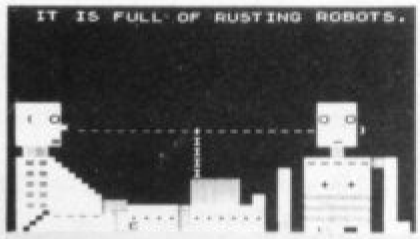


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Send SAE for more details.

PIXEL

Pixel Productions 39 Ripley Gdns. London SW14 8HF

```
294 IFPEEK(D-1)=224THEN590
295 POKE36878,15:POKE36864,11:POKE36877,250:FORM=1TO40:NEXT:POKE36877,0:POKED,3
2
300 POKE36864,12:GOTO270
380 POKED,60:POKED+30720,0
385 IFB$=" "THEN400
390 GETB$:IFB$=" "THEN430
400 D=D-1
405 POKE36878,15:POKE36876,140:FORW=1TO20:NEXT:POKE36876,0
410 FORM=1TO20:NEXT
420 POKED+1,32:GOTO290
424 REM****************        ****SHIP*******        ****************
430 FORB=7702TO7723
440 POKEB,62:POKEB+30720,0
445 POKE36878,15:POKE36876,220:FORP=1TO5:NEXTP:POKE36876,0
450 GETC$:IFC$=" "THEN490
470 FORP=1TO20:NEXTP
480 POKEB,32:NEXTB
481 GOTO380
484 REM****************        ****BOMB*******        ****************
490 L=200
491 FORC=B+22TOB+484STEP22
495 IFB<7706THEN530
496 POKE36878,5:L=L-1:POKE36876,L
500 POKEC,46:POKEC+30720,0
505 IFPEEK(C+22)=60THENS=S+1:GOTO550
510 R=0
512 IFPEEK(C+44)=224THENPOKE36876,0:POKEC,32:R=1:S=S-1:GOTO550
520 FORP=1TO30:NEXT:POKEC,32
530 NEXT
540 POKEB,32:GOTO380
550 POKE36876,0:POKEC+22,32:POKEC,32
551 PRINT"■SCORE"S
552 POKE36877,220
553 FORW=15TO0STEP-1
554 POKE36878,W
565 IFR=1THENPOKE36865,37
566 FORE=1TO30:NEXTE:IFR=1THENPOKE36865,39
567 FORE=1TO30:NEXTE,W
568 POKE36877,0:IFR=1THENPOKE36865,38
569 FORM=BTO7723
570 POKEM,62:POKEM+30720,0:POKE36878,15:POKE36876,220:FORW=1TO5:NEXT:POKE36876,
0
571 FORH=1TO40:NEXT:POKEM,32
575 NEXT
578 IFR=1THENPOKE36865,38:GOTO290
580 GOTO270
590 FORZ=0TO1:POKED+Z,224:POKED+Z+30720,6:NEXT:PRINTCHR$(142):POKED+2,223:POKED
+30722,6
594 POKE36878,4:POKE36877,180
595 FORZ=D+24TO8169STEP22:POKEZ,224:POKEZ+30720,6:NEXT
599 FORZ=8185TODSTEP-1
600 POKEZ,224:POKEZ+30720,6
610 NEXT
620 PRINTCHR$(14);"■■■■■■■HE DAM HAS BEEN":PRINT
630 PRINT"DESTROYED AND ITS ALL":PRINT
640 PRINT"■■■YOUR FAULT!!!":PRINT
644 U=INT((TI+0.5)/60)
645 PRINT"■■OU LASTED"U"■ SECS":PRINT:PRINT
646 PRINT"■■■AND SCORED"S:PRINT:PRINT
647 IFS>OTHENO=S
650 PRINT"■■NOTHER GO(Y/N)?":PRINT"■"
655 POKE36877,0
660 GETD$
670 IFD$="Y"THENPRINT"■":S=0:GOTO70
680 IFD$<>"N"THEN660
700 PRINT"■"
710 PRINTCHR$(142):POKE650,0
720 END
```



```
10 REM DRAGON'S TEETH BY C. GORDON
20 GOSUB 230
30 BX=BX+ (JOYSTK (0) <20 AND BX>0) — (JOYSTK(0)>40) AND BX<27):
   PRINT@ 416+BX, B$; :RETURN
40 GOSUB 30
50 TP=BP+BD: IF TP>1503 THEN 120 ELSE IF PEEK (TP)=128 THEN POKE BP,
   128 :POKE TP, 131: BP= TP: GOSUB 30: GOTO 40
60 GOSUB 30
70 IF PEEK (TP)=245 THEN BD=BD+2: GOTO 40
80 IF PEEK (TP)=140 THEN BD=-32+ (BD=31) — (BD=33): IF SC-MX>60 THEN
   MX=SC: GOSUB 330 :GOTO 40 ELSE GOTO 40
90 IF PEEK(TP)>143 AND PEEK(TP)<230 THEN POKE TP,128:SC=SC
   +1:PRINT@489,"";:PRINT USING "####";SC;:SOUND
   160,1:BD=32-(ABS(BD)=31)+(ABS(BD)=33):GOTO40
100 IF PEEK(TP)=255 THEN BD=(-BD)+2*(BD<-32)-2*(BD>-32):GOTO 40
110 IF PEEK(TP)=250 THEN BD=BD-2:GOTO 40
120 SOUND 3, 10:POKE BP,128:BL=BL-1:IF BL=0 THEN 270 ELSE
    PRINT@509,"";:PRINT USING"#";BL;
130 PRINT@416,STRING$(32,128);
140 GOTO 180
150 CLS0:CLEAR200:PRINT@0,STRING$(32,255);:FOR I=0 TO 448 STEP 32:
    PRINT@I,CHR$(245);:PRINT@I+31,CHR$(250);:NEXT I
160 GOSUB 330
170 SC=0:BL=5
180 BP=1217+RND(10):BD=33
190 PRINT@483, "SCORE";:PRINT@503,"BALLS";:PRINT@509," ";:PRINT
    USING"#";BL;
200 B$=CHR$(128)+STRING$(3,140)+CHR$(128):BX=10:PRINT@416+BX,B$;
210 GOSUB 30:IF(PEEK(65280)AND 1)>0 THEN 210
220 GOTO 40
230 CLS:PRINT@6,"DRAGON'S TEETH":?:?"YOU ARE CONFRONTED BY A
    HORRIBLE DRAGON AND YOU ARE ONLY EQUIPPED WITH A BAT AND FIVE
    BALLS. ":PRINT "YOU WILL HAVE TO KNOCK OUT MOST OF ITS TEETH TO
    SURVIVE"
240 PRINT:PRINT"HIT ANY KEY TO START"
250 IF INKEY$=""THEN 250
260 GOTO150
270 CLS
280 PRINT USING"YOUR FINAL SCORE IS####";SC
290 F=0:PRINT@448, "WANT ANOTHER GAME ?"
300 Z$=INKEY$:IF Z$="" THEN 300
310 IF Z$="N" AND F=0 THEN PRINT@416,"DOES
    ANYONE ELSE":F=1:GOTO 300 ELSE IF Z$="N"
    THEN CLS:END
320 GOTO 150
330 FOR I=65 TO 161 STEP 32:PRINT STRING$(30,
    (143+(I-1)/2));:NEXT I:RETURN
340 END
```

BY COLIN GORDON

RUNS ON A DRAGON IN 32K

DRAGONS TEETH

If you thought fighting dragons was all about knights in armour, giant broadswords and maidens in distress you've got another think coming! All you really need to vanquish one of these fire-breathing reptiles is a table-tennis bat and five tennis-balls. Yes, really! And you don't even have to be John McEnroe to do it!

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Illustration: Dorian Cross

sinclair
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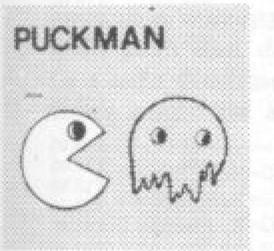
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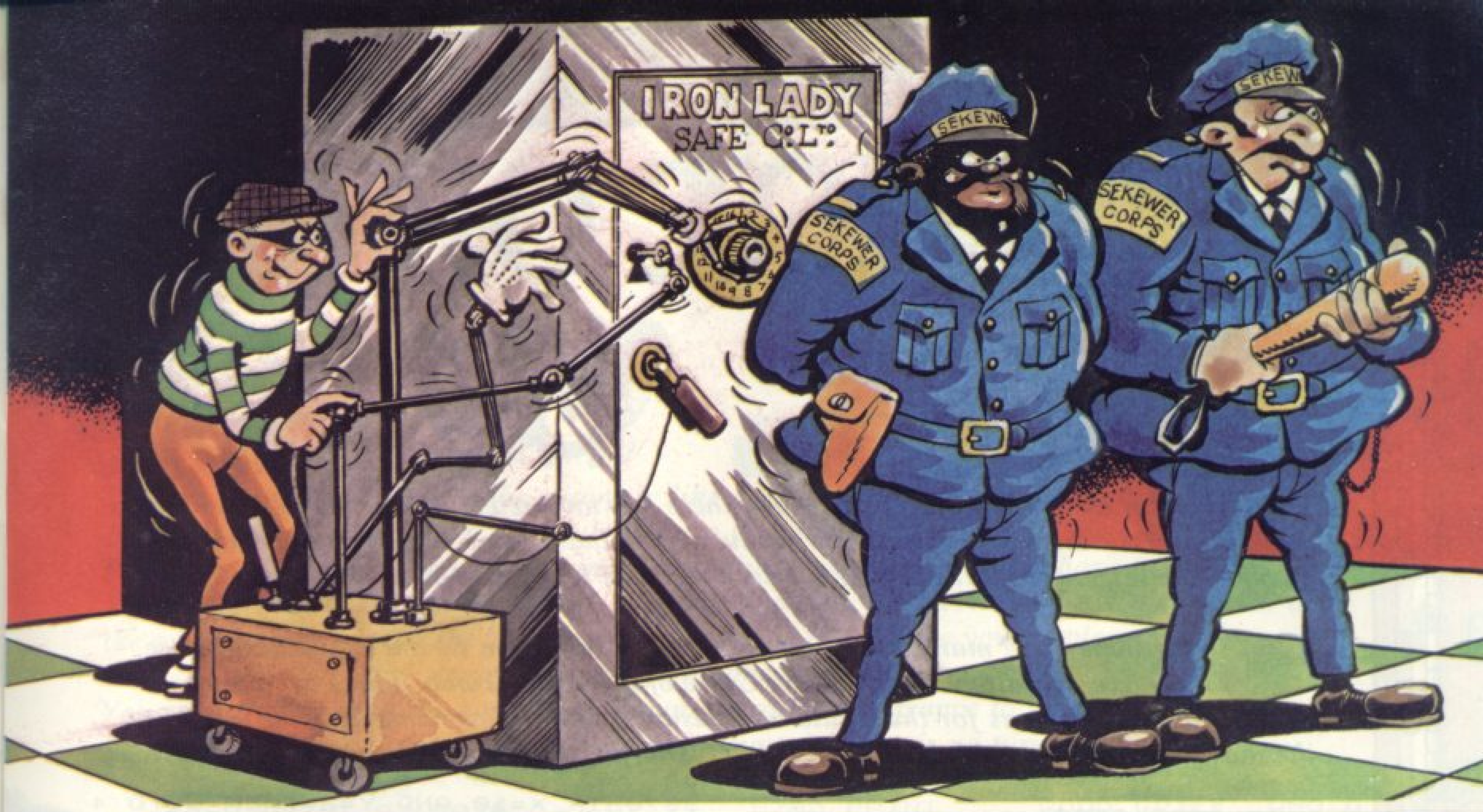


Illustration: Terry Rogers

RUNS ON AN ACORN ATOM IN 3K

BY STEPHEN MAYFROIDT

BULLION SNATCH

Psssst! Want to get a gold record? A criminal one that is. No it's not a Bucks Fizz number, stupid! I'm talking about real gold bars. All you have to do is find your way around a maze, pick up five gold bars and deposit them in a safe. Nothing to it. Well, there could be a few minor problems. Like the guards who roam the maze. They can be a bit nasty at times — lethal in fact. But only if you get on the wrong side of them. The safe is also guarded by two sentries. But that shouldn't put you off — just think of all that gold!

Scoring is as follows:

100 points are awarded for picking a gold bar up.

200 points are awarded for placing it in the safe.

500 bonus points + 1 extra live are awarded for picking up and depositing the five gold bars in the safe separately.

Once all the gold bars have been removed off the screen, "A" should be pressed — a new level of skill will be prepared, and your score and number of lives will be displayed.

The controls are — 'U' to move up, 'N' to move down, 'H' to move left, 'J' to move right.

```
6 DIMZZ50;M=0;O=£B002
7 W=0;L=3;R=3;C=50;Q=35;U=0
13 Z=£8021;X=0
14 ZZ2=£80F5;F.A=þTO10;ZZA=ZZ2+A;N.
15 F.A=11TO25;ZZA=£80E2;N.;F.A=20TO50;ZZA=£80E3+A-26;N.
17 ZZ0=£81BE;H=-32;ZZ1=£81DA;G=-1
18 IFR>50 R=50
20 IFU=1500 U=2000
21 W=W+U;IFU=2000 L=L+1
22 P.$12'"SCORE "W'''LIVES "L
23 F.A=1TO300;WAIT;N.
24 U=0
80 G.a
90 P.$12
100 F.A=1TOC;B=A.R.%510+1;B?£8000=£FF;N.
110 F.A=£8000 TO £801E;?A=£FF;N.;F.A=£801F TO £81FF S.32;
   ?a=£FF;N.
111 F.A=£81DE TO £81FF;?A=£FF;N.
112 F.A=£8000 TO £81DE S.32;?A=£FF;N.
119 F.A=1TO5;B=A.R.%510+1;B?£8000=115;N.
120 ?£81DE=127
131 A=0
200 LINK RRO
210 T=Z
215 IF?Z=42 G.b
220 IF?£80=53 Z=Z-32
230 IF?£80=46 Z=Z+32
240 IF?£80=40 Z=Z-1
250 IF?£80=42 Z=Z+1
255 IF?£80=33 AND Q=35;R=R+5;G.13
260 IF?z=42 G.b
270 IF?Z=£FF OR(?Z=127 AND Q=35)OR(Z<£8000ORZ>£81FF);Z=T
280 IF?Z=115 G.c
285 IF Q=£A3 AND ?Z=127;Q=35;P.$7;?Z=127;Z=£81BE;U=U+200
290 ?T=32;?Z=Q
295 IFM=0 G.z
296 IFM=1 R.
300 G.200
380zF.Y=2TOR
400 A=ABSRND%4+1;IFA=1 X=-32
401 IFA=2 X=32
402 IFA=3 X=-1
403 IFA=4 X=1
405 ?ZZY=32
406 IF(?(ZZY+X)=£FF)OR(?(ZZY+X)=127)G.410
407 IF(ZZY+X>£8000)AND(ZZY+X<£81FF)ZZY=ZZY+X.
410 ?ZZY=42
416 M=1;GOS.200
418 N.
419 M=0;F.A=1TO2
420 ?ZZ0=32;?ZZ1=32;ZZ0=ZZ0+G;ZZ1=ZZ1+H
430 ?ZZ0=42;?ZZ1=42
440 IF(ZZ1=£815A)OR(ZZ1=£81DA);H=H*-1;G=G*-1
445 N.
450 G.200
700bL=L-1;F.A=1TO80;?O=?O:4;N.;IFL  0 G.290
710 P.$12';F.A=1TO16;P.$7',"you're dead!!!!!!!!!!!!!!!";N.
715 IFU=1500 U=2000
716 W=W+U
720 P.'''''"SCORE "W;E.
800cQ=£A3;U=U+100;G.290
1000aDIM RR1,WW3,P-1;P.$21
1010 (;:RRO JSR £FE71;STY £80;RTS;)
1020 P.$6;G.90
```



CURSE OF THE



BY DAVID HEALEY

Somewhere in the Mountains of the Moon there lies an ancient Aztec temple. Inside this crumbling ruin there is a treasure so strange, so valuable and so cunningly hidden that bounty hunters from all over the world have been lured to take up the challenge to discover it.

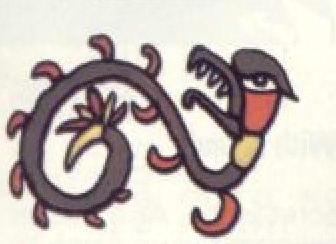
But so far none have managed to unearth the treasure from its ancient resting place. They have all fallen victim to the Curse of the Aztec Tomb. There are many unmentionable dangers for the would-be treasure hunter to overcome once he steps into the musty depths of the tomb and the only clue to the treasure's hiding place is a curious

```
  45 GOTO 9500
  50 LET X=28
  55 LET M=1
  60 LET Y=18
  65 LET G=0
  70 LET S=1000
  75 LET M1=0
  80 LET V=0
  90 GOSUB 9000
 100 GOSUB 2000
 280 PRINT AT A-1,C-1;" "
 285 IF A=21 THEN GOSUB 2000
 290 PRINT AT A,C;"O"
 300 LET S=S-25
 303 LET A=A+1
 305 LET C=C+1
 333 IF A=Y AND C=X THEN GOTO 93
00
 350 PRINT AT Y,X;"+"
 360 IF INKEY$="1" THEN GOSUB 30
00
 370 IF INKEY$="0" THEN GOTO 320
0
 500 GOTO 270
2000 LET A=3
2010 LET C=13
2020 RETURN
3000 LET X=X-1
3005 LET S=S+100
3010 LET Y=Y-1
3015 PRINT AT Y+1,X+1;" "
3017 IF Y=2 THEN GOTO 3500
3018 RETURN
3200 PRINT AT Y,X;" "
3210 LET S=S-200
3220 LET Y=Y-2
3230 PRINT AT Y,X;"+"
3235 IF C=X-1 THEN GOTO 3240
3236 PRINT AT Y,X;" "
3237 LET Y=Y+2
3238 GOTO 240
3240 PRINT AT A-1,C-1;" "
3245 FOR Q=1 TO 3
3250 PRINT AT A,C;" "
3260 LET A=A+1
3270 LET C=C+1
3280 PRINT AT A,C;"O"
3290 NEXT Q
3295 PRINT AT A,C;" "
3300 GOTO 3236
3500 LET X=12
3510 LET Y=2
3520 LET S=S+300
3530 PRINT AT Y,X;"+"
3550 IF X=4 THEN GOTO 3560
3555 IF INKEY$="0" THEN GOSUB 40
00
3560 IF INKEY$="1" THEN GOTO 370
0
3570 IF X=10 AND Y=2 THEN GOTO 4
200
3580 IF X=7 AND Y=2 THEN GOTO
 4200
3585 LET S=S-25
3590 IF X=5 AND Y=2 THEN GOTO
 4200
3595 IF X>12 THEN LET X=12
3600 IF X=3 THEN GOTO 4400
3620 GOTO 3530
3700 PRINT AT Y,X;" "
3710 LET X=X-1
3720 LET S=S+100
3730 PRINT AT Y,X;"+"
3735 IF X=9 THEN GOTO 3560
3740 GOTO 3570
4000 LET Y=Y-1
4010 PRINT AT Y+1,X;" "
4020 PRINT AT Y,X;"+"
4030 LET Y=Y-1
4040 LET X=X-1
4050 PRINT AT Y+1,X+1;" "
4060 PRINT AT Y,X;"+"
4070 LET Y=Y+1
4080 LET X=X-1
4090 PRINT AT Y-1,X+1;" "
4100 LET Y=Y+1
4110 PRINT AT Y-1,X;" "
4120 PRINT AT Y,X;"+"
4130 LET S=S-75
4140 GOTO 3570
4200 FOR Z=1 TO 9
4210 PRINT AT Y,X;" "
4220 LET Y=Y+1
4230 PRINT AT Y,X;"+"
4240 NEXT Z
4250 PRINT AT Y,X;"▒"
4260 GOTO 9350
4400 LET S=S+300
4500 LET S=S-10
4507 IF INT (RND*10)=1 THEN GOTO
 5000
4510 IF INT (RND*10)=2 THEN GOTO
 5300
4520 IF INKEY$="0" THEN GOTO
 5500
5000 IF V=1 THEN GOTO 4500
5010 LET V=1
5015 LET M=0
5020 PRINT AT 9,3;" ";AT 10
,3;" ";AT 11,3;" "
5021 PRINT AT 9,1;"▖";AT 10
,1;"▘▖";AT 11,2;"▚"
5024 PRINT AT 9,1;" ";AT 10
,1;"  ";AT 11,2;" "
5050 PRINT AT 9,0;"▖";AT 10
,1;"▚";AT 11,2;"▚"
5075 PRINT AT 9,0;" ";AT 10
```

Illustration: Dorian Cross

AZTEC TOMB





RUNS ON A ZX81 IN 16K

Aztec symbol — which looks strangely like a modern dollar sign. But you'll have to struggle to even find that . . .

This is an adventure game based almost entirely on graphics and you have to explore the scene presented to you on the screen. The only controls you have are the '1' key which is the walk command and the '0' key which can be used to make your explorer, represented by a plus sign, jump over any obstacles.

You start the game at the base of the mountain and the entrance to the tomb is on the far side. Once you are at the base of the mountain there is no turning back . . .

```
,1;" ";AT 11,2;" "
5080 PRINT AT 10,0;"▗";AT 11
,1;"▀▄"
5085 PRINT AT 10,0;" ";
AT 11,1;" "
5090 PRINT AT 12,0;"▀▀▀▀"
5100 GOTO 4500
5300 IF V=0 THEN GOTO 4500
5310 LET V=0
5315 LET M=1
5320 PRINT AT 12,0;"    "
5325 PRINT AT 10,0;"▗";AT 11,1;"
▀▄"
5327 PRINT AT 10,0;" ";AT 11,1;"
 "
5330 PRINT AT 9,0;"▗";AT 10,1;"▀▄
";AT 11,2;"▀▄"
5340 PRINT AT 9,0;" ";AT 10,1;"
 ";AT 11,2;" "
5350 PRINT AT 9,1;"▗";AT 10,1;"▘
▗";AT 11,2;"▀▄"
5355 PRINT AT 9,1;" ";AT 10,1;"
 ";AT 11,2;" "
5360 PRINT AT 9,0;" ";AT 10,1;"
 ";AT 11,2;" "
5370 PRINT AT 9,3;"▛";AT 10,3;"▛
";AT 11,3;"▌"
5375 IF M=1 AND M1=1 THEN GOTO 5
540
5380 GOTO 4500
5500 LET M1=1
5505 PRINT AT Y,X;" "
5510 LET S=S+100
5520 LET Y=Y-1
5530 PRINT AT Y,X;"+"
5531 IF M=1 THEN GOTO 5540
5532 IF INT (RND*3)=1 THEN GOTO
6000
5540 LET Y=Y-1
5550 LET X=X-1
5560 PRINT AT Y+1,X+1;" "
5570 PRINT AT Y,X;"+"
5580 LET Y=Y+1
5590 LET X=X-1
5600 PRINT AT Y-1,X+1;" "
5610 PRINT AT Y,X;"+"
5620 FOR K=1 TO 10
5630 PRINT AT Y,X;" "
5640 LET Y=Y+1
5650 PRINT AT Y,X;"+"
5660 IF Y=11 AND V=1 THEN GOTO 6
000
5670 NEXT K
5678 LET S=S-750
5680 PRINT AT 18,0;"▟▙"
5685 PRINT AT 19,0;"▐▌"
5690 FOR J=1 TO 50
5695 NEXT J
5696 IF G=1 THEN GOTO 6850
5697 CLS
5700 PRINT "   GOOD GRIEF, WHO D
O YOU THINK"
5710 PRINT "YOU ARE, SUPERMAN. F
ANCY DOING"
5720 PRINT "A SWAN DIVE OFF THE
TOP OF A"
5730 PRINT "CLIFF. WHAT SOME PEO
PLE WILL DO"
5740 PRINT "FOR A BIT OF AZTEC T
REASURE."
5750 PRINT
5760 PRINT "YOU SCORED ";S
5770 PRINT "PRESS N/L TO RE-STAR
T"
5780 IF INKEY$="" THEN GOTO 5780
5785 CLS
5790 GOTO 50
6000 IF INT (RND*3)=2 THEN GOTO
5700
6030 LET S=S-15
6050 IF X>8 THEN LET X=8
6055 IF X=4 AND INT (RND*5)=2 TH
EN GOTO 7200
6057 IF X=8 THEN GOTO 7800
6060 IF INKEY$="1" THEN GOTO 630
0
6070 IF INKEY$="0" THEN GOTO 690
0
6110 GOTO 6050
6300 LET X=X+1
6310 PRINT AT Y,X-1;" "
6320 PRINT AT Y,X;"+"
6325 LET S=S+100
6330 GOTO 6050
6700 LET Y1=12
6710 LET X1=0
6720 PRINT AT Y1-1,X1;"  "
7220 PRINT AT 9,3;"▒▒▒▒"
7230 GOSUB 7300
7240 PRINT AT 10,3;"▀▀▀▀"
7250 GOSUB 7300
7260 PRINT AT 10,3;"▒▒▒▒"
7270 GOSUB 7300
7280 PRINT AT 11,3;"▀▀▀▀"
7290 GOSUB 7300
7295 PRINT AT 11,3;"▒▒▒▒"
7297 GOTO 7350
7300 REM
7310 RETURN
7320 LET S=S-300
7350 CLS
7360 PRINT "   AN INTERESTING FE
ATURE OF "
7370 PRINT "AZTEC ARCHITECTURE I
S THE CLEVER"
7380 PRINT "LITTLE CEILINGS THAT
 LOWER "
7390 PRINT "THEMSELVES DOWN ON T
OP OF"
```



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```
7400 PRINT "UNSUSPECTING EXLOPLO
RERS"
7410 PRINT "ESPECIALLY WHEN THEY
 ARE ONLY"
7420 PRINT "YARDS AWAY FROM THE
FABULOUS"
7430 PRINT "TREASURES OF THE INN
ER TOMB. "
7440 PRINT
7450 PRINT "YOU SCORED ";S
7455 PRINT
7460 PRINT "PRESS N/L TO RE-STAR
T"
7470 IF INKEY$="" THEN GOTO 7470
7475 CLS
7480 GOTO 50
7800 PRINT AT 9,8;"$"
7805 LET D=0
7810 IF D=6 THEN GOTO 7985
7815 IF INKEY$="0" THEN GOTO 785
0
7820 GOTO 7810
7850 IF INT (RND*8)=4 THEN GOTO
7900
7855 LET D=D+1
7857 LET S=S-50
7860 LET Y=Y-1
7865 PRINT AT Y+1,X;" ";AT Y,X;"
+"
7870 LET Y=Y+1
7875 PRINT AT Y-1,X;" ";AT Y,X;"
+"
7880 GOTO 7810
7900 LET Y=Y-2
7910 PRINT AT Y+2,X;" ";AT Y,X;"
+"
7920 LET Y=Y+2
7930 PRINT AT Y-2,X;" ";AT Y,X;"
+$"
7935 PRINT AT 0,0;"CONGRATULATIO
NS, YOU HAVE FOUND"
7940 PRINT "THE AZTEC TREASURE A
ND SCORED "
7944 LET S=S+2500
7945 PRINT S
7950 PRINT AT 11,10;"  "
7955 PRINT AT 9,11;"    "
7960 PRINT AT 10,11;"    "
7965 PRINT AT 11,11;"    "
7970 PRINT AT 11,12;"**";AT 11,1
2;"▒▒";AT 11,12;"▒▒"
7975 PRINT AT 10,12;"**";AT 10,1
2;"▒▒";AT 10,12;"▒▒"
7980 GOTO 7970
7985 FOR J=1 TO 30
7986 NEXT J
7987 CLS
7990 PRINT "    YOU HAVE BEEN BIT
TEN BY A"
7992 PRINT "DEADLY KING COBRA. N
OT A LOT YOU"
7994 PRINT "CAN DO ABOUT THAT, Y
OU FORGOT TO"
7996 PRINT "BRING SOMEONE TO SUC
K OUT THE"
7997 PRINT "POISON."
7998 LET S=S-250
7999 GOTO 9315
8000 LET M=1
8010 GOTO 5300
9000 PRINT AT 3,0;"     ██ █ ██ ██
"
9010 PRINT "       █ ███
9020 PRINT "       █ ████
9030 PRINT "       ███████
9040 PRINT "       ████████
9050 PRINT "       █████████
9060 PRINT "       ██ ████████
9070 PRINT "       █  █████████
"
9080 PRINT "    █   ██████████
█"
9090 PRINT "     ████████████████
██"
9100 PRINT "     ████████████████
███"
9110 PRINT "     ████████████████
████"
9120 PRINT "     ████████████████
█████"
9130 PRINT "     ████████████████
██████"
9140 PRINT "     ████████████████
███████"
9150 PRINT "     ████████████████
████████"
9160 PRINT "     ████████████████
█████████"
9170 PRINT "████████████████████
██████████"
9180 PRINT "████████████████████
███████████"
9200 RETURN
9300 FOR J=1 TO 50
9301 NEXT J
9302 CLS
9303 PRINT "    YOU HAVE BEEN SQU
ASHED BY A"
9305 PRINT "BOULDER. YOURE CERTA
INLY NOT THE"
9310 PRINT "ATHLETIC TYPE ARE YO
U?"
9315 PRINT
9317 LET S=S-500
9320 PRINT "YOU SCORED ";S
9325 PRINT
9330 PRINT "PRESS N/L TO RE-STAR
T"
9335 IF INKEY$="" THEN GOTO 9335
9338 CLS
9340 GOTO 50
9350 FOR J=1 TO 50
9352 NEXT J
9353 LET S=S-500
9354 CLS
9355 PRINT "    YOU HAVE DROWNED
IN THE MOAT."
9360 PRINT "ISNT IT ABOUT TIME Y
OU LEARNT TO"
9365 PRINT "TO SWIM? I SUPPOSE I
TS A BIT "
9370 PRINT "LATE THOUGH NOW."
9375 PRINT
9380 PRINT "YOU SCORED ";S
9385 PRINT
9390 PRINT "PRESS N/L TO RE-STAR
T"
9395 IF INKEY$="" THEN GOTO 9395
9400 CLS
9410 GOTO 50
9500 PRINT AT 2,4;"CURSE OF THE A
ZTEC TOMB"
9510 PRINT AT 6,0;"    YOU ARE FA
CED WITH THE TASK"
9520 PRINT "OF EXPLORING A SACRE
D MOUNTAIN"
9530 PRINT "OF THE AZTECS, IN WH
ICH ONE OF"
9540 PRINT "THEIR GREAT LEADERS
IS RUMOURED"
9550 PRINT "TO BE BURIED ALONG W
ITH UNTOLD"
9560 PRINT "RICHES IN ANCIENT RE
LICS."
9570 PRINT "    THE ONLY CLUE YOU
 HAVE IS "
9580 PRINT "THAT YOU MUST SEEK O
UT A KEY "
9590 PRINT "WHICH CLOSELY RESEMB
LES A DOLLAR"
9600 PRINT "SIGN."
9610 PRINT "BEWARE OF THE CURSE.
 THERE ARE"
9620 PRINT "MANY DANGERS TO FACE
 ON YOUR WAY"
9630 PRINT "TO THE TREASURE. GOO
D LUCK."
9640 PRINT "    KEY 1 ALLOWS YOU
TO MOVE"
9650 PRINT "FORWARD AND KEY 0 AL
LOWS YOU TO"
9660 PRINT "JUMP. PRESS N/L TO S
TART"
9670 PRINT AT 0,0;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
9680 PRINT AT 4,0;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒
▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
9690 PRINT AT 1,0;"▒";AT 2,0;"▒"
;AT 3,0;"▒"
9700 PRINT AT 1,31;"▒";AT 2,31;"
▒";AT 3,31;"▒"
9710 IF INKEY$="" THEN GOTO 9710
9715 CLS
9720 GOTO 50
9980 SAVE "ONLY B"
9990 GOTO 1
```

RUNS ON A

3000 SERIES PET

IN 8K

BY NEIL STEVENSON

TUNNEL RUN

Meanwhile back in space . . . the long and winding tunnel faces our brave astronaut trapped deep in the heart of a very unfriendly planet.

You have to steer a ship through the tunnel avoiding outcrops of rock and deadly mines. To keep the ship flying you must navigate through fuel gates which you'll find tucked away in the tunnel.

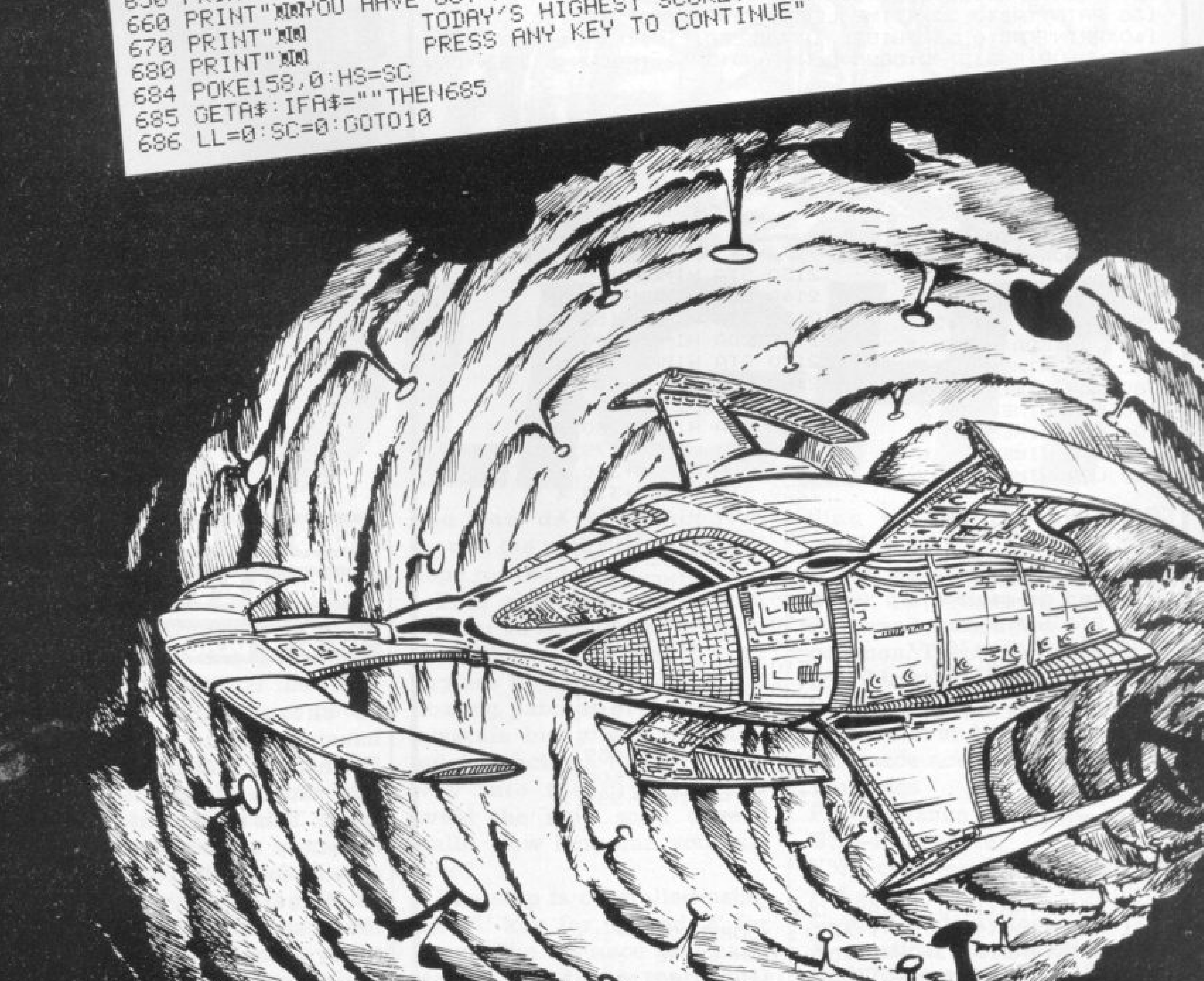
There is a high score feature built into the program and you can alter the width of the tunnel as you get more skilful at navigating through the tortuous twists and turns. Control keys are '4' for left and '6' for right.

So now it's all up to you — are you a space-age artful dodger?

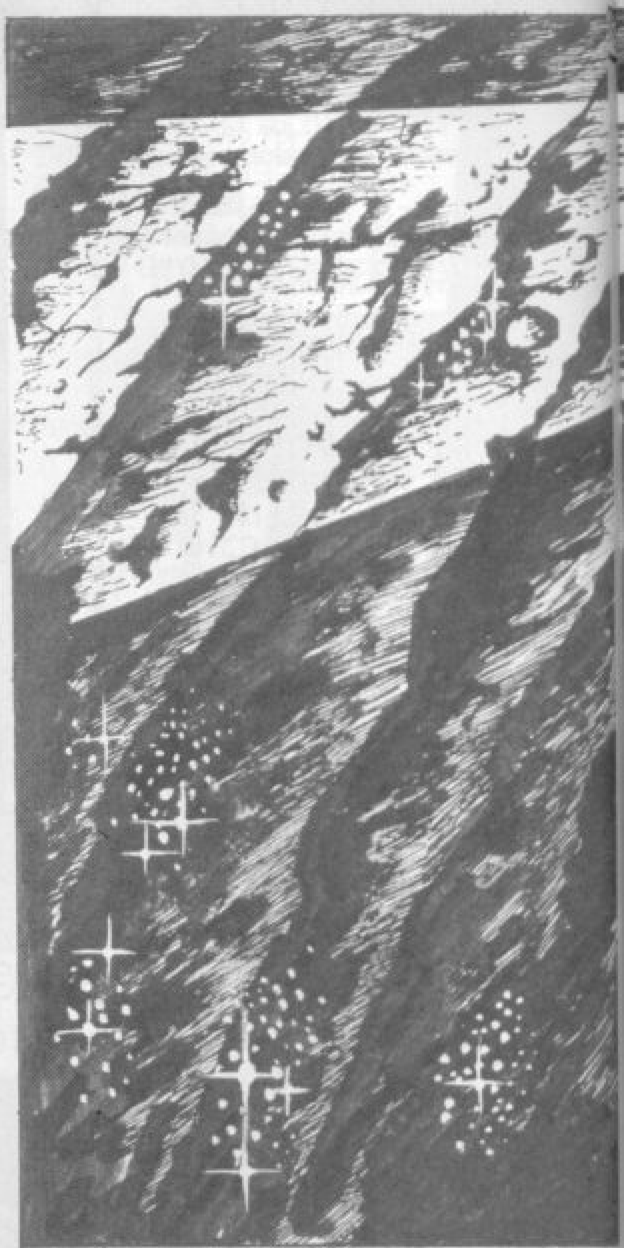
```
5 REM************ TUNNELRUN *********
6 REM*** OCT.1982 BY NEIL STEVENSON****
10 PRINT"": FORA=32768TO32807:POKEA,160:NEXT
20 FORA=32807TO33767STEP40:POKEA,160:NEXT
30 FORA=33767TO33728STEP-1:POKEA,160:NEXT
40 FORA=33728TO32728STEP-40:POKEA,160:NEXT
50 PRINT"                                  "
60 PRINT      "                            "
70 PRINT      "                            "
71 PRINT"FLY YOUR SHIP(V) THROUGH THE WINDING";
72 PRINT" TUNNEL,AVOIDING MINES(◆) AND "
73 PRINT"OUTCROPS OF ROCK.NAVIGATE THROUGH"
74 PRINT"THE FUEL GATES(●-●) FOR A BONUS."
75 PRINT"       4-MOVE LEFT  6-MOVE RIGHT"
76 PRINT"  INPUT WIDTH OF TUNNEL(3-IMPOSSIBLE"
77 PRINT"TO 9-EASY)"
78 GETA$:GG=VAL(A$):IFGG<3ORGG>11THEN78
79 GG=GG*2
100 PRINT"":G=33272:PRINT"                         "
   :REM*25 CURSOR DOWNS*
110 H=33748:FORA=HTOH-(40*12)STEP-40:POKEA,160:NEXT
115 FORA=H+GGTOH+GG-(40*12)STEP-40:POKEA,160:NEXT
120 POKEG,32:POKEH,160:POKEH+GG,160:PRINT"":POKEG,22
130 IFPEEK(G+40)<>32THEN500
140 SC=SC+1
150 IFPEEK(151)=41THENPOKEG,32:G=G+1:GOTO240
160 IFPEEK(151)=42THENPOKEG,32:G=G-1:GOTO240
170 A=INT(RND(1)*8)+1
175 IFA=1ANDH>33728THENH=H-1:GOTO120
180 IFA=1THENH=H+1:GOTO120
190 IFA=2ANDH<(33767-GG)THENH=H+1:GOTO120
200 IFA=2THENH=H-1:GOTO120
210 IFA=3THENCH=H+INT(RND(1)*GG-3)+3:POKECH,81:
    POKECH+1,64:POKECH+2,81:GOTO120
220 IFA=4THENPOKEH+1,160:POKEH+2,160:POKEH+3,
    160:GOTO120
230 IFA=5THENPOKEH+GG-1,160:POKEH+GG-2,160:
    POKEH+GG-3,160:GOTO120
231 IFA=6THENPOKEH+INT(RND(1)*GG-3)+3,90:GOTO120
```

Illustration: Dorian Cross

```
235 A=INT(RND(1)*2)+1:GOTO175
240 IFPEEK(G)<>32ORPEEK(G+40)<>32THEN500
250 POKEG,22:GOTO170
500 IFPEEK(G)=64ORPEEK(G+40)=64THENPOKEG+40,32:SC=SC+10:GOTO170
510 FORA=1TO10:POKEG,160:FORB=1TO50:NEXT:POKEG,32:FORB=1TO50:NEXT:NEXT
520 POKEG,32:LL=LL+1:IFLL>2THEN540
530 GOTO100
540 PRINT"▒▒▒▒▒▒▒"
550 A$="   G A M E   O V E R   "
560 PRINT"▒▒▒▒▒▒▒▒▒";:FORA=1TO21:PRINTMID$(A$,A,1);:FORB=1TO100:NEXT:NEXT
570 FORA=1TO2000:NEXT
580 PRINT"▒"
590 IFSC>HSTHEN630
600 PRINT"▒▒▒▒▒▒▒               YOU SCORED "SC" POINTS!!!"
610 PRINT"▒▒               THE HIGH-SCORE IS "HS
620 PRINT"▒▒▒               PRESS ANY KEY TO CONTINUE."
621 POKE158,0
625 GETA$:IFA$=""THEN625
626 SC=0:LL=0:GOTO10
630 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒";
640 PRINT  "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
650 PRINT  "▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒";
660 PRINT"▒▒YOU HAVE GOT AN AMAZING "SC" POINTS!!"
670 PRINT"▒▒            TODAY'S HIGHEST SCORE!!"
680 PRINT"▒▒            PRESS ANY KEY TO CONTINUE"
684 POKE158,0:HS=SC
685 GETA$:IFA$=""THEN685
686 LL=0:SC=0:GOTO10
```



```
1 MODE7
2 F%=0
3 ENVELOPE1,1,-26,-26,-26,255,255,255,50,0,0,-50,49,0
4 ENVELOPE2,1,1,1,1,10,10,80,100,-1,0,0,100,0
10 PROCINIT
11 MODE7:Y%=1:VDU23;8202;0;0;0;
15 SOUND1,1,255,255
20 PRINTTAB(0,21)"CAVE FLIGHT"
30 UP=2:DOWN=15
40 X=10:FORI%=0TO20:PRINTTAB(0,I%)CHR$(&91):NEXT
45 TIME=0
46 REPEAT
47 FORI%=0TO20:PRINTTAB(39,I%)" ":NEXT
48 IFF%<40 THEN TIME=0
50 FORI%=0TOUP:PRINTTAB(39,I%)CHR$(255):NEXT
60 FORI%=DOWN TO20:PRINTTAB(39,I%)CHR$(255):NEXT
70 PRINTTAB(1,X)"  "
80 A$=INKEY$(0):IFA$="A" AND X>2 THEN X=X-1
90 IFA$="Z" AND X<20 THEN X=X+1
100 J%=HIMEM+3+40*X:J%=?J%
110 IF J%=255 OR TIME>1000 THEN 3000
120 IF J%=ASC("*") THEN TIME=0:SOUND2,2,100,20
123 IF RND(10)=1 THEN PRINTTAB(37,RND(DOWN-UP)+UP)CHR$(
&81+RND(6));"*";CHR$(&91)
124 Y%=Y%+1:IFY%=30 THEN PRINTTAB(37,RND(DOWN-UP)+UP)CH
R$(&81);"*";CHR$(&91):Y%=1
125 CALL START
127 PRINTTAB(1,X)CHR$(244);CHR$(240)
130 PRINTTAB(0,22)"TIME LEFT ";10-(TIME DIV 100);"    "
140 PRINTTAB(0,23)"DIST. TRAVELLED:";F%:F%=F%+1
150 UP=UP+RND(3)-2:DOWN=DOWN+RND(3)-2:IFDOWN<5 THEN DOW
N=DOWN+RND(5)
160 IF UP>15 THEN UP=UP-RND(5)
170 IF UP<1THENUP=1
175 IF DOWN>19 THEN DOWN=19
177 IF DOWN<=UP+2 THEN DOWN=UP+4
180 UNTIL FALSE
2000 DEFPROCINIT
2010 DIM X 140
2020 FORPASS=0TO2 STEP2
2030 P%=X
2040 [OPT PASS
2050 .START LDX #2
2060 .PP LDA HIMEM,X
2070 STA HIMEM-1,X
2080 LDA HIMEM+40,X
2090 STA HIMEM+39,X
2100 LDA HIMEM+80,X
2110 STA HIMEM+79,X
2120 LDA HIMEM+120,X
2130 STA HIMEM+119,X
2140 LDA HIMEM+160,X
2150 STA HIMEM+159,X
2160 LDA HIMEM+200,X
2170 STA HIMEM+199,X
2180 LDA HIMEM+240,X
2190 STA HIMEM+239,X
2200 LDA HIMEM+280,X
2210 STA HIMEM+279,X
2220 LDA HIMEM+320,X
2230 STA HIMEM+319,X
2240 LDA HIMEM+360,X
2250 STA HIMEM+359,X
2260 LDA HIMEM+400,X
2270 STA HIMEM+399,X
2280 LDA HIMEM+440,X
2290 STA HIMEM+439,X
2300 LDA HIMEM+480,X
2310 STA HIMEM+479,X
2320 LDA HIMEM+520,X
2330 STA HIMEM+519,X
2340 LDA HIMEM+560,X
2350 STA HIMEM+559,X
2360 LDA HIMEM+600,X
2370 STA HIMEM+599,X
2380 LDA HIMEM+640,X
2390 STA HIMEM+639,X
2400 LDA HIMEM+680,X
2410 STA HIMEM+679,X
2420 LDA HIMEM+720,X
2430 STA HIMEM+719,X
2440 LDA HIMEM+760,X
2450 STA HIMEM+759,X
2460 LDA HIMEM+800,X
2465 STA HIMEM+799,X
2470 INX
2480 CPX #40
2490 BEQ P
2500 JMP PP
2510 .P RTS
2515 ]
2520 NEXT PASS
2540 ENDPROC
3000 PRINTTAB(10,11)"GAME OVER"
3001 PRINTTAB(9,12)CHR$(&87);"YOUR SCORE ";F%
3002 PRINTTAB(9,13)CHR$(&87)"HIGH SCORE ";H%
3003 IFF%>H% THEN PRINTTAB(8,14)CHR$(&87);CHR$(&88);"YOU
GOT THE HIGH SCORE!!":H%=F%
3005 *FX15,0
3010 FORI=1 TO 10000:NEXT:RUN
```



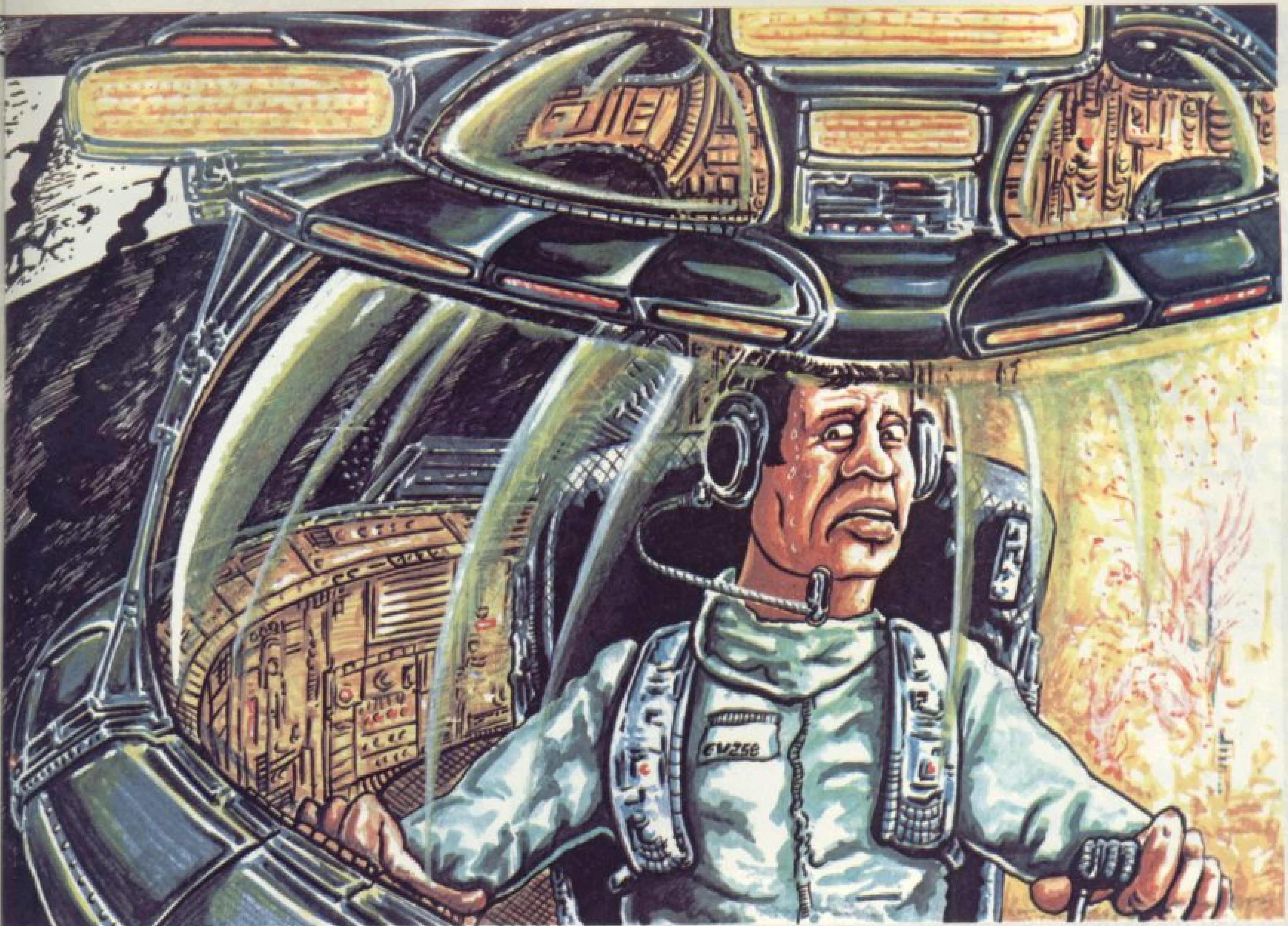
CAV

RUNS ON A BBC

MODEL A & B IN 16K

BY S. R. BLACKBURN

The year is 2094. All reserves of energy have been exhausted and the people of the Earth have had to resort to a new source of power — Zydomium. This is an element twice as heavy as uranium and can only be found deep in the heart of Planet Io. Every year a brave space pilot is sent to Io to fly through the dangerous cave system and collect a supply of Zydomium crystals — which, strangely, float weightless in the caverns —



VE FLIGHT

before teleporting them to Earth or Mars.

This year you, as an ace pilot from the C&VG space fleet, have been chosen for the task. You have negotiated the caverns, collected the crystals and are making your way back to the surface.

Suddenly all the alarms that can go off in your ship do just that. Lights are flashing, bells ringing, and beepers beeping. The automatic navigation system cuts out, the power control system explodes in a mass of sparks, and every other system apart from life support also cuts out. Your ship is careering through the caverns at breakneck speed — and all you can do is manoeuvre around the rocky outcrops and hope for the best!

Your ship only has enough fuel for 10 seconds more flight time. You can recharge your engines by flying through the floating patches of Zydomium crystals but you must have quick reactions to steer your way into the crystals and avoid the very solid cavern walls. How long can you survive?

The ship is controlled using the 'A' key for up and 'Z' for down. The distance you have travelled and how much fuel you have left will be displayed at the bottom of the screen. Your fuel does not start running out until your score reaches 40.

The walls of the cave will never quite close up but long diagonal passageways are common. These may seem impossible to fly through but all the caverns are navigable. A score of over 2,000 puts you in the space ace class!

Variables
F%—distance travelled.
H%—high score.
Y%—counter for position of red stars.
I—used in delay loops.
X—vertical position of ship.
DOWN—position of cave floor.
UP—position of cave ceiling.
A$—used for input of movement.

Illustration: Dorian Cross

Sinclair ZX Spectr



16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!

First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power–personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum



The ZX Printer–available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set–including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive–coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.





ZX Spectrum software on cassettes–available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion...Flight Simulation...Chess...History...Inventions...VU-CALC...VU-3D...47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE–Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST–use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

EITHER WAY–please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt–and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum–16K RAM version	100	125.00	
	Sinclair ZX Spectrum–48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

CVG901

FREEPOST–no stamp needed. **Prices apply to UK only.** **Export prices on application.**



GALAXIANS

BY CRAIG FISHER



From out of the deepest recesses of space comes a convoy of aliens bent on destruction — your destruction! Can you halt their determined advance?

This is a version of arcade Galaxians, complete with those nasty swooping craft which dive down at you from the skies. To make scoring harder in this version you can only shoot these diving aliens — and not the ones in the convoy.

Key '1' moves your laser base left, key '3' right. Use '0' to fire. The high score so far, claimed by the author, is 4100. Can you do better?

TABLE OF VARIABLES

Alien 1:-
- **H: Horizontal position**
- **A$: Character(s)**
- **ID: Direction (−1 for left; 1 for right)**
- **OH: Previous horizontal pos. of alien.**

Alien 2:-
- **L: horizontal position**
- **B$: Character(s)**
- **IDL: Direction (see above)**
- **OL: previous horizontal pos. of alien.**

- **A: High score**
- **s: Current score**
- **Y: Horizontal pos. of convoy.**
- **D: Direction of convoy (see above)**
- **P: Position of laser base.**
- **V: FOR . . . NEXT loop: height of aliens.**
- **W: Current wave No.**
- **W$: Flags string: shows No. of wave s on screen — 51.**
- **DI: Temporary direction variable.**
- **G$: Convoy character string.**

Illustration: Terry Rogers

RUNS ON A SPECTRUM IN 16K

```
   1 REM
   2 REM
   3 REM  SPECTRUM   GALAXIANS
   4 REM  © C.D. Fisher 6/1982
   5 REM
   6 REM
   7 REM
   8 REM
  10 BORDER 0: PAPER 0: INK 7: C
LS
  11 PRINT AT 10,10; FLASH 1;"pl
ease wait."
  12 GO SUB 1000
  13 GO SUB 5000
  14 RANDOMIZE
  15 LET a=0
  19 LET s=0
  20 LET w=1: LET w$="FFFFFFFFFF
FFFFFFFFFFF"
  25 LET D=1
  26 LET y=2
  27 LET g$=" OP OP OP OP OP OP
 OP OP OP OP OP OP OP OP OP OP
"
  30 LET P=8
  39 LET y=2
  42 FOR i=50 TO 2 STEP -3: IF g
$(i)=" " THEN NEXT i
  44 LET h=i-19*(i>19)-19*(i>38)
+y
  45 LET g$(i-1 TO i+1)="   "
  46 IF i<4 THEN GO TO 89
  47 LET id=(h<16)-(h>=16)
  49 FOR x=50 TO 2 STEP -3: IF g
$(x)=" " THEN NEXT x
  54 LET l=x-19*(x>19)-19*(x>38)
+y
  55 LET g$(x-1 TO x+1)="   "
  56 LET id1=(h<16)-(h>=16)
  80 LET oh=h: LET ol=l
  88 LET b$="GH"
  89 LET a$="GH"
  90 CLS
  91 PRINT INVERSE 1;AT 1,1;"1up
:";s;TAB 15;"HIGH SCORE:";a
  92:
  93: REM     Main Loop
  94:
  95 FOR v=3 TO 19
 100 PRINT AT v-1,oh;"  ";AT v-1
,ol;"  "
 105 PRINT INVERSE 1;AT 1,5;s; I
NVERSE 0; INK 4;AT 3,y;g$( TO 21
);TAB y;g$(22 TO 38);TAB y;g$(39
 TO )
 110 PRINT INK 3;AT v,h;a$;AT v,
l;b$; INK 7;AT 20,p-2;"  B  "
 115 LET y=y+d: IF y<2 OR y>10 T
HEN LET d=-d
 119 IF INKEY$="0" THEN INK 2: P
LOT p*8+3,16: DRAW 0,130: BEEP .
03,50: DRAW OVER 1;0,-130: INK 7
 120 IF INKEY$="0" AND (((p=h OR
 p=h+1) AND a$<>"") OR ((p=l OR
p=l+1) AND b$<>"")) THEN GO SUB
248
 125 BEEP .01,-14
 130 IF RND>.5 THEN GO SUB 800
 140 LET p=p+2*((INKEY$="3") AND
 p<29)-2*((INKEY$="1") AND p>2)
 141 LET oh=h: LET ol=l
 150 LET di=(INT (RND*2)+1)*id
 155 LET h=h+di
 156 IF h>30 OR h<0 THEN LET id=
-id: LET h=30*(l>16): GO TO 150
 159 LET di=(INT (RND*2)+1)*id1
 160 LET l=l+di
 161 IF l>30 OR l<0 THEN LET id1
=-id1: LET l=30*(l>16): GO TO 15
9
 165 LET l=l+((l<2)-(l>30))
 166 IF a$="" AND b$="" THEN GO
TO 176
 167 PLOT INVERSE 1;0,15: DRAW I
NVERSE 1;254,0
 169 PRINT AT 21,0;w$( TO w)
 170 NEXT v
 171 IF a$="GH" OR b$="GH" THEN
GO SUB 600
 176 IF x<6 AND i<6 AND a$="" AN
D b$="" THEN LET w=w+1: LET s=s+
50: PRINT AT 1,9; FLASH 1;"BONUS
": PAUSE 250: PAUSE 0: GO TO 25
 180 IF ABS (p+1-l)>1 AND ABS (p
+1-h)>1 THEN GO TO 40
 190 IF (ABS (p+1-l)<=1 AND b$="
") OR (ABS (p+1-h)<=1 AND a$="")
 THEN GO TO 40
 195 PRINT AT 20,p; FLASH 1;"B"
 200 PRINT AT 10,10; FLASH 1;"SC
ORE:";s: BEEP 1,20
 201 IF a<s THEN LET a=s
 202 LET s=0
 203 LET li=3
 215 PAUSE 0: PAUSE 0
 220 GO TO 20
 230:
 231: REM Subroutine to Explode
 232: REM   Appropriate alien.
 233:
 248 LET s=s+10
 249 BEEP .5,35
 250 IF p=h+1 OR p=h THEN PRINT
AT v,h;"00": LET a$=""
 260 IF p=l+1 OR p=l THEN PRINT
AT v,l;"00": LET b$=""
 270 RETURN
 595:
 596: REM Subroutine to replace
 597: REM aliens in 'pool' if
 598: REM they escape.
 599:
 600 IF a$="GH" THEN LET g$(x TO
 x+1)="OP"
 610 IF b$="GH" THEN LET g$(i TO
 i+1)="OP"
 620 RETURN
 795:
 796: REM Subroutine to fire
 797: REM aliens missles.
 798:
 800 LET c$="hl"(INT (RND*2)+1)
 805 IF c$="h" AND a$="" OR c$="
l" AND b$="" THEN RETURN
 806 INK 6
 810 PLOT VAL c$*8+8,(21-v)*8-2
 815 DRAW VAL c$*8+8-PEEK 23677,
16-PEEK 23678
 816 INK 7
 830 IF VAL c$=p OR VAL c$+1=p T
HEN GO TO 195
 840 DRAW OVER 1;0,(19-v)*8-2
 850 RETURN
 995:
 996: REM Subroutine to set up
 997: REM  user-defined chars.
 998:
1000 FOR x=1 TO 7: READ p$: FOR
n=0 TO 7
1010 READ r: POKE USR p$+n,r
1020 NEXT n: NEXT x
1030 DATA "o",2,2,71,125,7,31,59
,49
1040 DATA "p",64,64,226,190,224,
246,220,140
1041 DATA "g",49,56,31,7,125,71,
2,2
1042 DATA "h",140,220,248,224,19
0,226,64,64
1050 DATA "b",24,60,153,169,255,
255,219,129
1075 DATA "q",145,82,0,3,192,0,7
4,145
1076 DATA "r",128,192,224,192,12
8,128,128,128
1080 RETURN
4994:
4995: REM Subroutine to print
4996: REM  instructions & scores
4998:
5000 CLS
5005 PRINT TAB 10;"SPECTRUM GALA
XIANS"'',"by C.fisher."
5009 PRINT '"  The object of thi
s game is to"
5010 PRINT "shoot as many of the
 diving,      firing aliens as you
 can --"
5020 PRINT "so getting a high sc
ore."
5025 PRINT ''TAB 5; FLASH 1;"THE
 CONTROLS:-"
5030 PRINT '"key '1'   moves you
 left"
5040 PRINT " "  '3'   "   "
right"
5050 PRINT " "  '0'   fires your
 laser."
5060 PRINT '' PAPER 2; FLASH 1;"
GOOD LUCK  !!"
5070 INPUT "(press 'enter' to be
gin)"'' LINE a$
5080 RETURN
```

Here's a really explosive board game. You'll have to be really careful not to start off a chain reaction which will literally wipe you out!

It's a two player game based on a board game called Explosion — difficult to play on a board but tailor made for the TRS-80. You are presented with a 6×6 grid and each player in turn introduces one of his counters either onto an empty square or a square occupied by one or more of his own counters. However, each square has a point at which critical mass is reached and fission occurs. Corner squares explode when two counters are on them, side squares explode when containing three counters, central squares go up when four counters occupy their space.

When an explosion occurs the counters on the exploding square are distributed across the board. Any enemy counters on the latter square are captured and become counters belonging to the mover. Should receiving squares attain critical mass further explosions will result.

Any player having no counters left at the end of his opponent's move is the loser. The game has some interesting sound effects which can be enjoyed via the cassette port.

RUNS ON A TRS-80 IN 3K **BY PETER MILLEN**

CRITICAL MASS

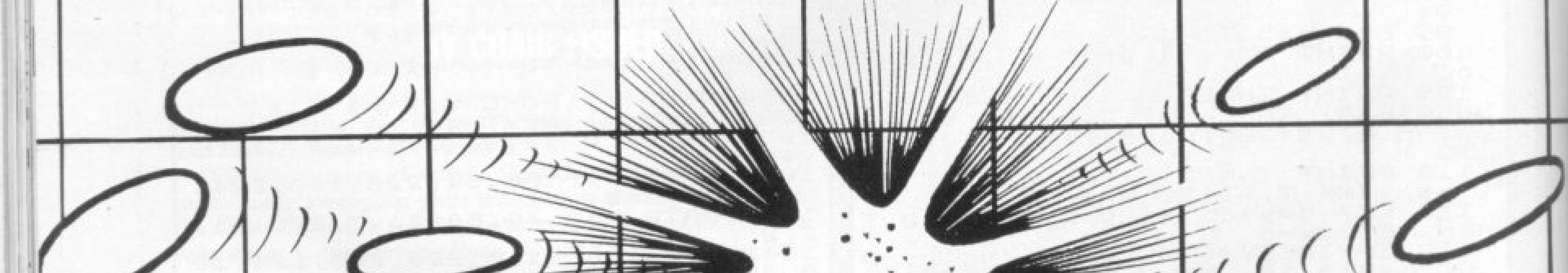
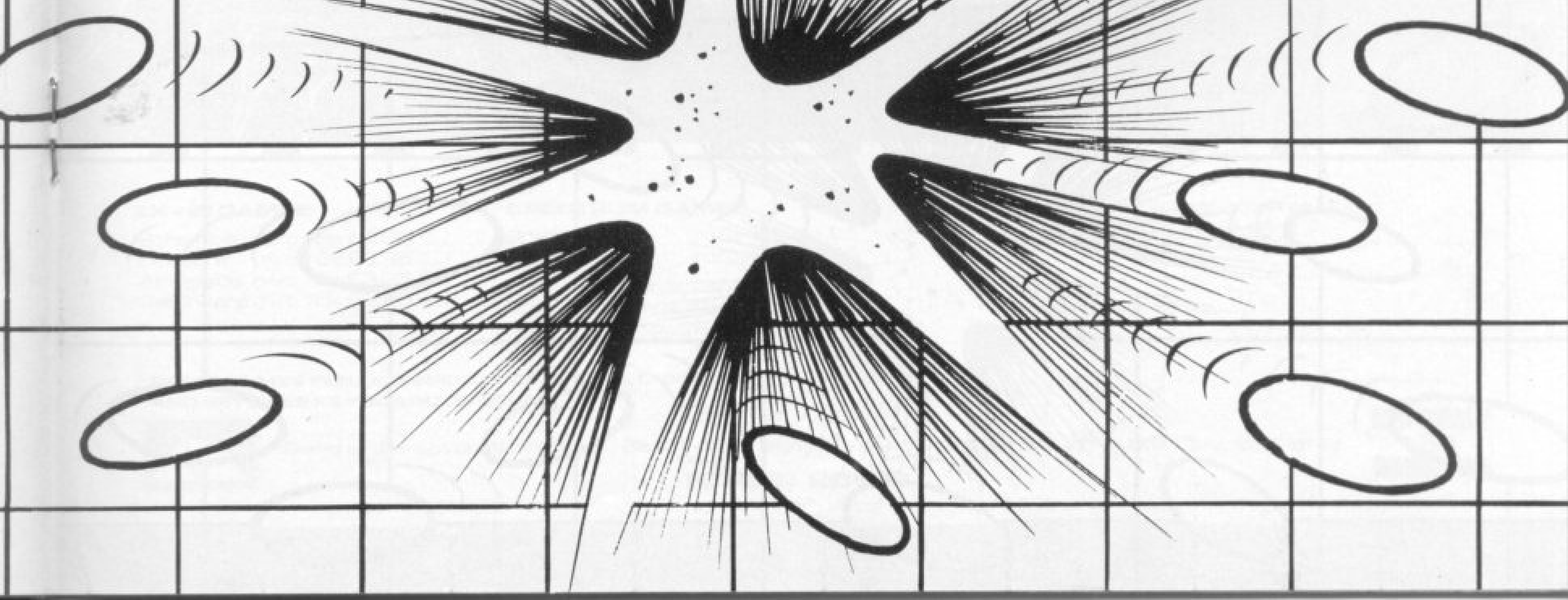


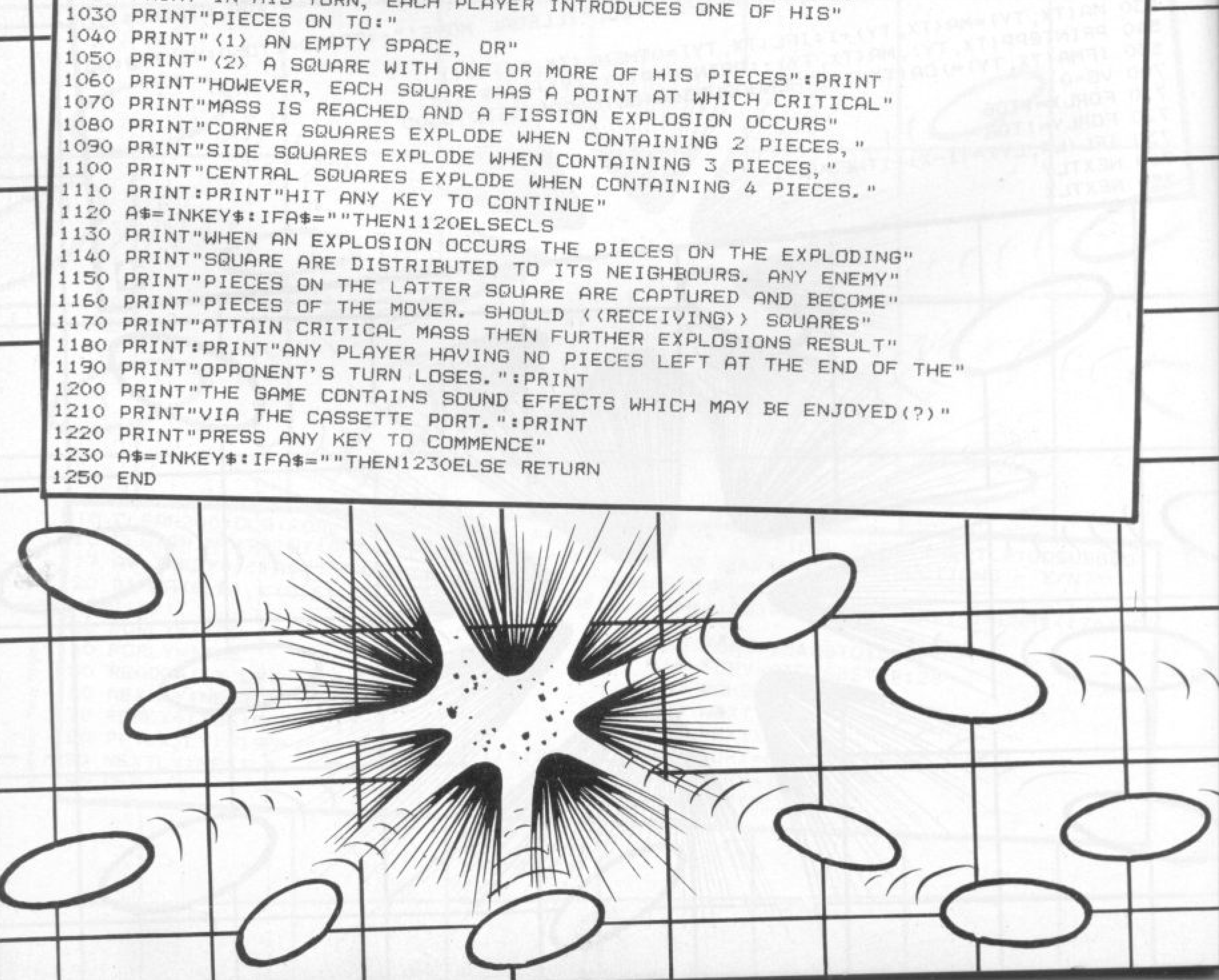
Illustration: Terry Rogers

```
10 CLEAR200:CLS:FORLX=1TO16:PRINTTAB(LX)CHR$(23)"CRITICAL MASS":NEXTLX:GOSUB840
15 CLS:PRINT:PRINT:PRINT:PRINT:PRINTCHR$(23)"DO YOU WANT INSTRUCTIONS - Y/N?"
17 A$=INKEY$:IFA$=""THEN17ELSEIFA$="Y"THENGOSUB1000
20 DIMMA(6,6),L(6,6),CA(6,6),PP(6,6):A$(0)=CHR$(183)+CHR$(187):A$(1)=CHR$(174)+C
HR$(157)
30 FORLX=1TO6
40 FORLY=1TO6
50 READCA(LX,LY)
60 NEXTLY:NEXTLX
70 FORLX=1TO6:FORLY=1TO6
80 PP(LX,LY)=193+(LX-1)*10+(LY-1)*128
90 NEXTLY:NEXTLX
95 CLS
100 FORX=15488TO15547
110 FORY=0TO768STEP128
120 POKEX+Y,140
130 NEXTY
140 NEXTX
150 FORX=0TO120STEP20
160 FORY=7TO43
170 SET(X,Y)
```

```
180 NEXTY
190 NEXTX
200 FORLX=1TO6
210 PRINT@(69+(LX-1)*10),LX;:PRINT@(253+(LX-1)*128),LX;
220 NEXTLX
230 X=0:GOTO500
300 FORLX=1TO5
310 PRINT@PP(TX, TY), STRING$(8, 191);:FORTD=1TO50:NEXTTD:XX=USR(100)
320 PRINT@PP(TX, TY), STRING$(8, 128);:FORTD=1TO50:NEXTTD
330 NEXTLX
340 MA(TX, TY)=MA(TX, TY)-CA(TX, TY)
350 IFMA(TX, TY))0THENPRINT@PP(TX, TY), MA(TX, TY);:PRINT@PP(TX, TY)+4, A$(X);ELSEL(TX
, TY)=0
360 EY=TY-1:IFEY=0THENGOTO370ELSEGOSUB940
370 EX=TX-1:IFEX=0THENGOTO380ELSEGOSUB930
380 EY=TY+1:IFEY>6THENGOTO390ELSEGOSUB940
390 EX=TX+1:IFEX>6THENRETURNELSEGOSUB930:RETURN
400 FG=0
410 FORTX=1TO6
420 FORTY=1TO6
430 IFMA(TX, TY)=>CA(TX, TY)THENFG=1:GOSUB300
440 NEXTTY
450 NEXTTX
460 GOSUB700:IFFG=1THENGOTO400ELSEGOTO500
500 X=1-X
510 PRINT@5, "PLAYER";A$(X);" WHICH COLUMN?";:GOSUB960
515 PRINT@5, STRING$(24, 128);:PRINT@30, "WHICH ROW?";:GOSUB970:PRINT@30, STRING$(20
, 128);
520 IFL(TX, TY)()X+1ANDL(TX, TY)THENPRINT@5, "ILLEGAL MOVE!";:FORTD=1TO50:NEXTTD:GO
TO510
530 MA(TX, TY)=MA(TX, TY)+1:IFL(TX, TY)=0THENL(TX, TY)=X+1
540 PRINT@PP(TX, TY), MA(TX, TY);:PRINT@PP(TX, TY)+4, A$(X);
550 IFMA(TX, TY)=>CA(TX, TY)THENGOSUB300:GOTO400ELSEGOTO500
700 VG=0
710 FORLX=1TO6
720 FORLY=1TO6
730 IFL(LX, LY)=(1-X)+1THENVG=1
740 NEXTLY
750 NEXTLX
```



```
760 IFVG=1THENRETURN
770 FORLX=1TO5
780 PRINT@5,"WIN FOR PLAYER ";A$(X);"!":FORTD=1TO50:NEXTTD
785 FORYY=1TO50:XX=USR(YY):NEXTYY
790 PRINT@5,"
795 NEXTLX                          ":FORTD=1TO50:NEXTTD
800 CLS
810 PRINTCHR$(23)"WANT TO PLAY AGAIN (Y/N) ?"
820 A$=INKEY$:IFA$=""THEN820
830 IFA$="Y"THENFORLX=1TO6:FORLY=1TO6:MA(LX,LY)=0:L(LX,LY)=0:NEXTLY:NEXTLX:GOTO9
5ELSEGOTO1250
835 REM ** SOUND EFFECT SUBROUTINE **
840 POKE16553,255
850 SF$=STRING$(24,191)
860 I=VARPTR(SF$):JJ=PEEK(I+2)*256+PEEK(I+1):IFJJ>32767THENJJ=-1*(65536-JJ)
870 FORPS=JJTOJJ+23:READD:POKEPS,D:NEXTPS
880 POKE16526,PEEK(I+1):POKE16527,PEEK(I+2):RETURN
890 DATA205,127,10,14,60,65,62,01,211,255,16,254,65,60,211,255,16,254,43,124,181
,32,238,201
900 DATA2,3,3,3,3,2,3,4,4,4,4,3,3,4,4,4,4,3
910 DATA3,4,4,4,4,3,3,4,4,4,4,3,2,3,3,3,3,2
930 L(TX,EY)=X+1:MA(TX,EY)=MA(TX,EY)+1:PRINT@PP(TX,EY),MA(TX,EY);:PRINT@PP(TX,EY
)+4,A$(X);:RETURN
940 L(EX,TY)=X+1:MA(EX,TY)=MA(EX,TY)+1:PRINT@PP(EX,TY),MA(EX,TY);:PRINT@PP(EX,TY
)+4,A$(X);:RETURN
960 I$=INKEY$:IFI$=""THEN960ELSEIFVAL(I$)<1ORVAL(I$)>6THEN960ELSETX=VAL(I$):RETU
RN
970 I$=INKEY$:IFI$=""THEN970ELSEIFVAL(I$)<1ORVAL(I$)>6THEN970ELSETY=VAL(I$):RETU
RN
1000 CLS:PRINTTAB(30)"CRITICAL MASS":PRINT
1010 PRINT"THIS IS A GAME FOR TWO PLAYERS ON A 6 X 6 BOARD."
1020 PRINT"IN HIS TURN, EACH PLAYER INTRODUCES ONE OF HIS"
1030 PRINT"PIECES ON TO:"
1040 PRINT"(1) AN EMPTY SPACE, OR"
1050 PRINT"(2) A SQUARE WITH ONE OR MORE OF HIS PIECES":PRINT
1060 PRINT"HOWEVER, EACH SQUARE HAS A POINT AT WHICH CRITICAL"
1070 PRINT"MASS IS REACHED AND A FISSION EXPLOSION OCCURS"
1080 PRINT"CORNER SQUARES EXPLODE WHEN CONTAINING 2 PIECES,"
1090 PRINT"SIDE SQUARES EXPLODE WHEN CONTAINING 3 PIECES,"
1100 PRINT"CENTRAL SQUARES EXPLODE WHEN CONTAINING 4 PIECES."
1110 PRINT:PRINT"HIT ANY KEY TO CONTINUE"
1120 A$=INKEY$:IFA$=""THEN1120ELSECLS
1130 PRINT"WHEN AN EXPLOSION OCCURS THE PIECES ON THE EXPLODING"
1140 PRINT"SQUARE ARE DISTRIBUTED TO ITS NEIGHBOURS. ANY ENEMY"
1150 PRINT"PIECES ON THE LATTER SQUARE ARE CAPTURED AND BECOME"
1160 PRINT"PIECES OF THE MOVER. SHOULD ((RECEIVING)) SQUARES"
1170 PRINT"ATTAIN CRITICAL MASS THEN FURTHER EXPLOSIONS RESULT"
1180 PRINT:PRINT"ANY PLAYER HAVING NO PIECES LEFT AT THE END OF THE"
1190 PRINT"OPPONENT'S TURN LOSES.":PRINT
1200 PRINT"THE GAME CONTAINS SOUND EFFECTS WHICH MAY BE ENJOYED(?)"
1210 PRINT"VIA THE CASSETTE PORT.":PRINT
1220 PRINT"PRESS ANY KEY TO COMMENCE"
1230 A$=INKEY$:IFA$=""THEN1230ELSE RETURN
1250 END
```



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MZ LUDO

Quick thinking, an eye for the main chance and a grasp of tactics are what you need to beat the computer at this adaptation of the famous board game Ludo. It may seen simple at first but your Sharp will prove a tough opponent in this battle of wits. If you fancy a more even battle why not take on a friend — the program allows for two players to take part.

All the normal rules of the board game apply here — and the computer will not allow you to cheat!

There's a nice graphic dice to control all the moves and you simply use the 'Space' key to get it rolling.

Remember if you manage to land on an opponent's counter — represented on the Sharp board by graphic characters — it sends him right back where he started from — a very satisfying move!

For those who can't remember the childhood tactics of the game, it's all a question of deciding which piece to push along in front.

I tend towards a one-out, all-out strategy but will let you develop your own tactics to get your four counters home fastest.

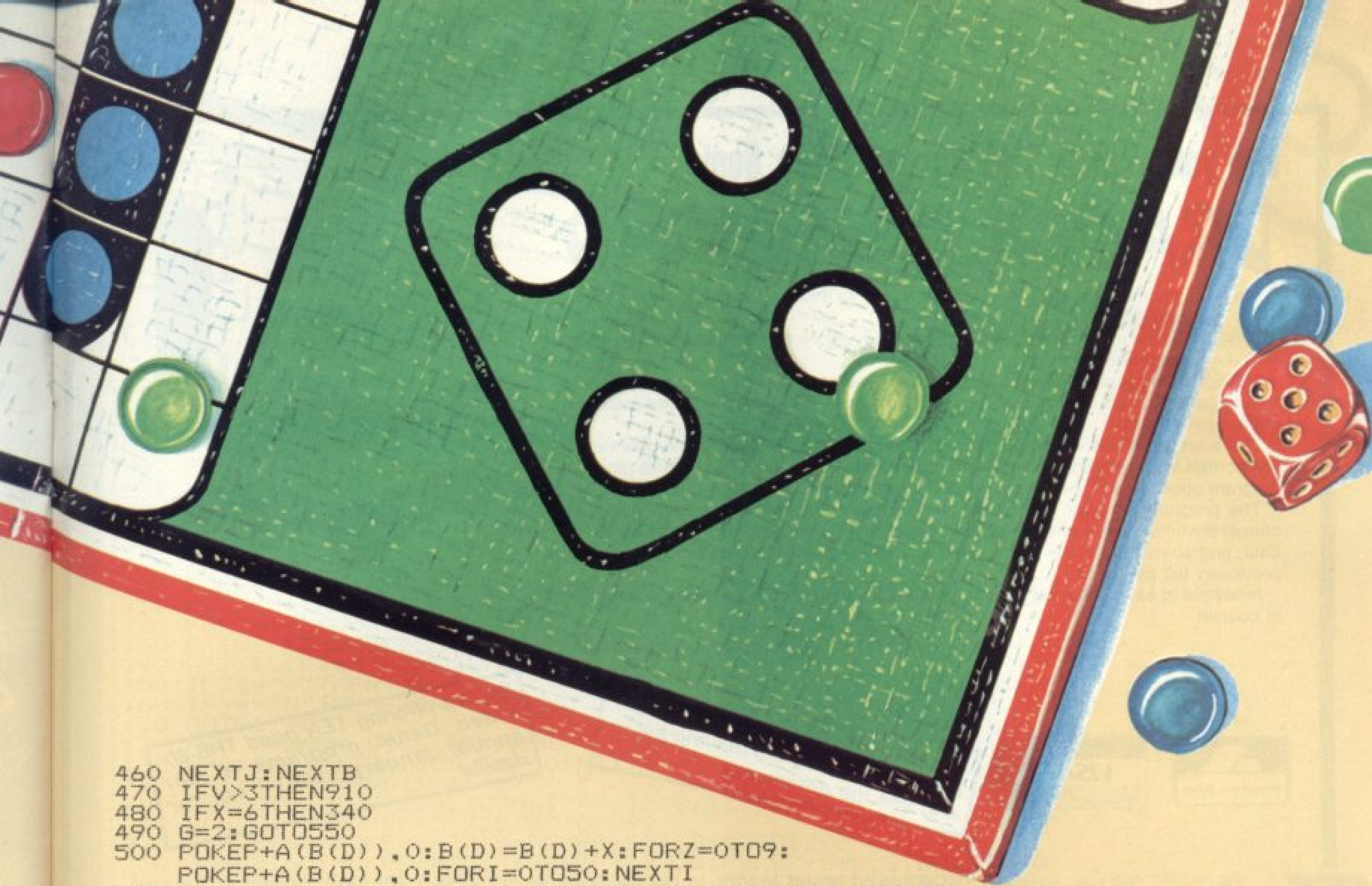
You will need to get an exact move to finish on, so there's a little luck involved at the death but you'll just have to trust your Sharp not to cheat on its dice throws.

It's during games like this that you really notice those Shift-y keys the Sharp has!!!

BY FRANK ROONEY

```
100 M$="_BOCDEFGAB¯C¯D¯E¯F¯G¯A¯B":TEMPO6:MUSICM$;M$;M$
110 P=53248:S=71:U=46:DIMA(U),E(U),C(4),D(4),K(4),L(4),F(4),B(4),N(4)
120 FORB=1TOU:READA(B):NEXTB:FORF=1TOU:READE(F):NEXTF
130 FORC=1TO4:READK(C):NEXTC:FORD=1TO4:READL(D):NEXTD:GOTO170
140 POKE4466,T:PRINTTAB(26);SPC(13):PRINT"■";TAB(26);SPC(13)
150 POKE4466,TT:PRINTTAB(26);SPC(13):PRINT"■";TAB(26);SPC(13)
160 POKE4466,10:FORI=1TO5:PRINTTAB(30);SPC(6):NEXTI:RETURN
170 FORD=1TO4:F(D)=D:B(D)=D:NEXTD
180 PRINT"■■■■■■■       How many players ? (1 or 2)"
190 GETPL:IF(PL<1)+(PL>2)THEN190
200 PRINT"■":IFPL=2THENPRINT"Player 1":PRINT"————————"
210 POKE4466,3:INPUT"Enter your name: ";A$:LA=LEN(A$):IFLA<14THEN230
220 GOSUB290:GOTO210
230 IFPL=1THEN270
240 PRINT"■■■Player 2":PRINT"————————"
250 POKE4466,9:INPUT"Enter your name: ";B$:LB=LEN(B$):IFLB<14THEN270
260 GOSUB290:GOTO250
270 PRINT"■■■Press 'SPACE' to throw the dice."
280 PRINT"■If you throw a 6 you get another go.":FORI=0TO500:NEXTI:GOTO300
290 PRINT"■Too long !!";SPC(28):FORI=0TO1000:NEXTI:PRINT"■";SPC(39):RETURN
300 PRINT"■■■■■■■■■** Press any key to start **"
310 GETX$:IFX$=""THEN310
320 T=6:TT=17:GOSUB1320:G=INT(RND(1)*2+1):IFG=2THEN550
330 IFG=2THEN560
339 REM ▒▒▒▒▒▒ PLAYER 1 ▒▒▒▒▒▒
340 V=0:T=6:TT=17:GOSUB140:GOSUB770
350 FORD=1TO4:IF(B(D)+X)>UTHENNEXTD:GOSUB890:GOTO480
360 M=PEEK(P+A(B(D)+X))
370 IF(M=67)+(M=108)+(M=208)+(M=74)THENNEXTD:GOSUB890:GOTO480
380 GOSUB820
390 IF(B(D)+X)>UTHENGOSUB850:GOTO380
400 M=PEEK(P+A(B(D)+X)):FORJ=1TO4:IFM=K(J)THENGOSUB850:GOTO380
410 NEXTJ
420 FORC=1TO4:IFM=L(C)THEN520
430 NEXTC
440 USR(62):GOSUB500
450 FORB=43TOU:FORJ=1TO4:IFPEEK(P+A(B))=K(J)THENV=V+1
```

RUNS ON A SHARP MZ-80K IN 32K

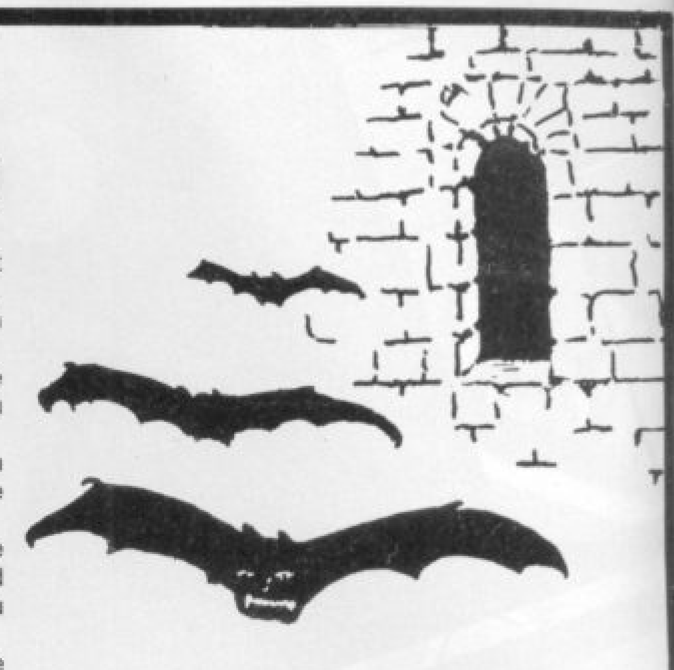


```
460 NEXTJ:NEXTB
470 IFV>3THEN910
480 IFX=6THEN340
490 G=2:GOTO550
500 POKEP+A(B(D)),0:B(D)=B(D)+X:FORZ=0TO9:
    POKEP+A(B(D)),0:FORI=0TO50:NEXTI
510 POKEP+A(B(D)),K(D):FORI=0TO50:NEXTI:NEXTZ:RETURN
520 MUSIC"¯D1B¯DG3":GOSUB500
530 FORB=1TO4:IFPEEK(P+E(B))=0THENPOKEP+E(B),M:F(C)=B:GOTO450
540 NEXTB
550 IFPL=1THEN930
559 REM ▒▒▒▒▒▒ PLAYER 2 ▒▒▒▒▒▒
560 W=0:T=17:TT=6:GOSUB140:GOSUB770
570 FORD=1TO4:IF(F(D)+X)>UTHENNEXTD:GOSUB890:GOTO700
580 N=PEEK(P+E(F(D)+X))
590 IF(N=65)+(N=83)+(N=68)+(N=70)THENNEXTD:GOSUB890:GOTO700
600 GOSUB820
610 IF(F(D)+X)>UTHENGOSUB850:GOTO600
620 N=PEEK(P+E(F(D)+X)):FORJ=1TO4:IFN=L(J)THENGOSUB850:GOTO600
630 NEXTJ
640 FORC=1TO4:IFN=K(C)THEN740
650 NEXTC
660 USR(62):GOSUB720
670 FORF=43TOU:FORJ=1TO4:IFPEEK(P+E(F))=L(J)THENW=W+1
680 NEXTJ:NEXTF
690 IFW>3THEN910
700 IFX=6THEN560
710 G=1:GOTO340
720 POKEP+E(F(D)),0:F(D)=F(D)+X:FORZ=0TO9:POKEP+E(F(D)),0:FORI=0TO50:NEXTI
730 POKEP+E(F(D)),L(D):FORI=0TO50:NEXTI:NEXTZ:RETURN
740 MUSIC"¯D1B¯DG3":GOSUB720
750 FORF=1TO4:IFPEEK(P+A(F))=0THENPOKEP+A(F),N:B(C)=F:GOTO670
760 NEXTF
770 POKE4466,T:PRINTTAB(30);"THROW"
780 FORI=0TO9:NEXTI:PRINT"■";TAB(30);SPC(5)
790 GETX$:IFX$=""THEN770
800 GOTO1180
810 RETURN
820 POKE4466,T:PRINTTAB(26);"Which piece ?"
830 GETD:IF(D<1)+(D>4)THEN830
840 PRINTTAB(31);"■";D:RETURN
850 POKE4466,T:PRINTTAB(26);SPC(13):MUSIC"G1_DG_DG_D":FORZ=0TO9
860 POKE4466,T:PRINTTAB(28);"ILLEGAL !!":FORI=0TO25:NEXTI
870 PRINT"■";TAB(26);SPC(13):FORI=0TO25:NEXTI:NEXTZ
880 PRINT"■";TAB(26);SPC(13):RETURN
890 MUSIC"G1_DG_DG_D":POKE4466,T:PRINTTAB(26);"You can't go!"
900 FORZ=1TO1500:NEXTZ:RETURN
910 MUSICM$;M$;M$:POKE4466,T:PRINTTAB(26);"  YOU WIN !!!":GOTO1120
920 FORZ=0TO5000:NEXTZ:RETURN
929 REM ▒▒▒▒▒▒ COMPUTER ▒▒▒▒▒▒
930 W=0:T=17:TT=6:GOSUB140:GOTO1180
940 FORD=1TO4:IF(F(D)+X)=<UTHENN(D)=PEEK(P+E(F(D)+X))
950 FORC=1TO4:IFN(D)=K(C)THEN1060
960 NEXTC:NEXTD
970 FORD=1TO4:IF((F(D)+X)=<U)*(N(D)=0)THENUSR(62):GOSUB1040:GOTO990
```

Illustration: Dorian Cross

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There are countless locations, objects and happenings, with the game operated in the normal way with either single key entries for the regular used words and the program operated with two separate words throughout.

The programmer says it will take on average three weeks to solve! But unlike normal adventures, this one can be saved to tape, thus allowing you to load the saved data, and so resume at the same place and time and with the same objects as you previously left the game.

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```
 980 NEXTD:GOTO1100
 990 FORF=43TOU:FORDD=1TO4:
     IFPEEK(P+E(F))=L(DD)THENW=W+1
1000 NEXTDD:NEXTF
1010 IFW>3THEN1110
1020 IFX=6THEN930
1030 G=1:GOTO340
1040 POKEP+E(F(D)),0:F(D)=F(D)+X:FORZ=0TO9:POKEP+E(F(D)),0:FORI=0TO50:NEXTI
1050 POKEP+E(F(D)),L(D):FORI=0TO50:NEXTI:NEXTZ:RETURN
1060 MUSIC"¯D1B¯DG3":GOSUB1040
1070 FORB=1TO4:IFPEEK(P+A(B))=0THENPOKEP+A(B),N(D):B(C)=B:GOTO990
1080 NEXTB
1090 MUSIC"G1_DG_DG_D"
1100 POKE4466,17:PRINTTAB(27);"Can't go !":FORZ=1TO1500:NEXTZ:GOTO1020
1110 MUSICM$;M$;M$:POKE4466,17:PRINTTAB(26);"    I WIN !!!"
1120 FORZ=1TO5000:NEXTZ
1130 PRINT"▓▓▓▓▓▓▓▓Do you want another game (Y or N) ?"
1140 GETX$:IFX$=""THEN1140
1150 IFX$="Y"THEN170
1160 IFX$="N"THENPRINT"▓":END
1170 GOTO1140
1179 REM ▓▓▓▓▓▓▓ DICE ▓▓▓▓▓▓▓
1180 H=0:FORX=1TO6:GOSUB1200:NEXTX
1190 H=1:X=INT(RND(1)*6+1)
1200 ONXGOTO1210,1220,1230,1240,1250,1270
1210 GOSUB140:POKEP+512,S:GOTO1290
1220 GOSUB160:POKEP+473,S:POKEP+551,S:GOTO1290
1230 GOSUB160:POKEP+434,S:POKEP+512,S:POKEP+590,S:GOTO1290
1240 GOSUB160:POKEP+430,S:POKEP+434,S:POKEP+590,S:POKEP+594,S:GOTO1290
1250 GOSUB160
1260 POKEP+430,S:POKEP+434,S:POKEP+512,S:POKEP+590,S:POKEP+594,S:GOTO1290
1270 GOSUB160:POKEP+430,S:POKEP+434,S:POKEP+510,S:POKEP+514,S:POKEP+590,S
1280 POKEP+594,S:GOTO1290
1290 IFH=0THENRETURN
1300 IF(PL=1)*(G=2)THEN940
1310 GOTO810
1320 PRINT"▓";
1330 PRINT"┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐";TAB(32-INT(LA/2));A$
1340 PRINT"│ │ │ │ │ │ │ │ │ │ │ │ │ │ │";TAB(32-INT(LA/2));
1350 FORI=1TOLA-1:PRINT"¯";:NEXTI:PRINT"¯"
1360 PRINT"├─┼─┴─┴─┴─┴─┼↑┼─┴─┴─┴─┴─┼─┤       ▓ ▚ ▒ □"
1370 PRINT"│ │   ←   S│ │   ←      │ │       1 2 3 4"
1380 PRINT"├─┤       T├─┤      ↑  ├─┤"
1390 PRINT"│ │    ┌▓│A│           │ │"
1400 PRINT"├─┤    ├─┤R├─┤         ├─┤"
1410 PRINT"│ │↓   │▚│T│ │         │ │"
1420 PRINT"├─┤    ├─┼─┼─┤         ├─┤"
1430 PRINT"│ │    │▒│□│ │  HOME   │ │"                 "
1440 PRINT"├─┤    └─┴─┴─┘  ┌─┬─┬─┬─┼─┤   ┌───────────┐"
1450 PRINT"│ │             │ │ │ │←│ │   │           │"
1460 PRINT"├─┼─┬─┬─┬─┐     └─┴─┴─┴─┴─┤   │           │"
1470 PRINT"│ │→│ │ │ │               │   │           │"
1480 PRINT"├─┼─┴─┴─┴─┘    ┌─┬─┬─┐    ├─┤ │           │"
1490 PRINT"│ │  HOME      │ │♠│♦│    │ │ └───────────┘"
1500 PRINT"├─┤            ├─┼─┼─┤    ├─┤"
1510 PRINT"│ │↓           │S│♥│ │ ↑  │ │"
1520 PRINT"├─┤            ├T├─┼─┘    ├─┤"
1530 PRINT"│ │            │A│♣│      │ │"
1540 PRINT"├─┤            ├R┤         ├─┤"
1550 PRINT"│ │    →       │T    →     │ │"
1560 PRINT"├─┼─┬─┬─┬─┬─┬─┼↓┼─┬─┬─┬─┬─┼─┤"
1570 PRINT"│ │ │ │ │ │ │ │ │ │ │ │ │ │ │         ♣ ♥ ♦ ♠"
1580 PRINT"└─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘         1 2 3 4▓"
1590 PRINT"▓▓▓▓▓";:IF(PL=1)*(LA=<9)THENPRINTTAB(17-INT(LA/2));A$:GOTO1620
1600 IFPL=1THENPRINTTAB(16);"YOU":GOTO1620
1610 PRINTTAB(14);"PLAYER 1"
1620 POKE4466,19
1630 IFPL=2THENPRINTTAB(4);"PLAYER 2":PRINT"▓";TAB(32-INT(LB/2));B$
1640 IFPL=2THENPRINTTAB(32-INT(LB/2));:FORI=1TOLB-1:PRINT"¯";:NEXTI:PRINT"¯"
1650 IFPL=1THENPRINT"▓▓▓COMPUTER":PRINTTAB(28);"▓COMPUTER▓▓▓▓▓▓▓▓────────"
1660 RETURN
1670 DATA207,287,367,369,371,291,211,131,51,49,47,45,43,41,121,201,281,361
1680 DATA441,521,601,681,761,841,921,923,925,927,929,931,933,935,937,939,941
1690 DATA943,863,783,703,623,543,463,461,459,457,455
1700 DATA777,697,617,615,613,693,773,853,933,935,937,939,941,943,863,783,703
1710 DATA623,543,463,383,303,223,143,63,61,59,57,55,53,51,49,47,45,43,41,121
1720 DATA201,281,361,441,521,523,525,527,529
1730 DATA67,108,208,74,65,83,68,70
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Illustration: Dorian Cross

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(CVG 0183)—Computer & Video Games—Jan. 1983

```
100 REM ***TX SOFTWARE***
110 REM R.MATTHEWS (1982)
120 REM *****************
130 DIM A(32):: A(1),A(2),A(3),A(31),A(30),A(31),A(32)=25
140 RANDOMIZE :: CALL MAGNIFY(3):: CALL COLOR(9,2,6,11,1,5,13,1,1)
145 CALL SCREEN(6):: CALL INSTRUCTIONS(PN)
150 A1$= "80C0FFFFFF3F78"&RPT$("0",22)&"FCFEFE8"
160 A2$="00011F3F3F3F0F7FFFFFFFFD5557F0000080E0FFE0E080FEFFFEFE5454FC"
170 A3$="FFFF"
180 A4$=RPT$("0",16)&"293B7FFFFF7F7F3F"&RPT$("0",16)&"80E0F5FEFFFFFFFF1C"
190 A5$="293B7FFFFF7F7F3F0707030303070F7F80E0F5F5FFFFFFFCFCE0C0C0C0E0F0FF"
200 A6$="34599D45B5AC7CBF7EFF7EFFCA425149"
210 A7$="E0404040"
220 A8$="7F7F66667F7F6666"
230 A9$="FEFE6666FEFE6666"
235 CALL CHAR(96,A1$,108,A2$,112,A3$,116,A4$,120,A5$)
236 CALL CHAR(124,A6$,104,A7$,132,A8$,128,A9$)
240 CALL CLEAR :: FOR J=4 TO 28 STEP 2 :: HT=INT(RND*10)+1
245 CALL VCHAR(24-HT,J,132,HT) ::CALL VCHAR(24-HT,J+1,128,HT)
250 A(J),A(J+1)=24-HT :: NEXT J :: CALL COLOR(13,2,6):: CALL HCHAR(24,1,112,32)
260 CALL SPRITE(#2,96,5,10,1,0,35)
265 CALL SPRITE(#4,108,16,178,100,0,5,#5,108,11,178,20,0,5)
266 CALL SPRITE(#6,108,12,178,180,0,5)
270 CALL KEY(1,K,S):: IF S THEN GOSUB 280  ELSE SC=SC-PN
271 GOTO 270
280 CALL POSITION(#2,X,Y)::CALL LOCATE(#2,X+1,Y)
285 CALL SPRITE(#3,104,16,X,Y,50,0):: CL=INT(Y/8.01)+1 :: X1=INT(X/8.01)+3
290 IF CL<4 OR CL>30 THEN 330
300 CALL COINC(ALL,C):: IF C THEN 360 ELSE CALL POSITION(#3,X,Y)
305 IF X>184 THEN 330 ELSE RW=INT(X/8.01)+1 :: IF RW<A(CL) THEN 300
310 CALL SPRITE(#3,124,2,X,Y,-20,0):: CALL SOUND(-200,-5,0)
315 CALL VCHAR(RW-2,CL,32,3) :: A(CL)=RW+1
320 SC=SC+10 :: DISPLAY AT(1,1):SC
330 CALL DELSPRITE(#3):: IF X1<16 THEN RETURN
340 FOR J=4 TO 29 :: IF A(J)<X1 THEN 380
350 NEXT J :: RETURN
360 CALL SPRITE(#3,116,16,176,Y,0,0):: CALL SOUND(-500,-5,0)
365 SC=SC+(75-RW)*4 :: DISPLAY AT(1,1):SC
370 CALL PATTERN(#3,120):: IF RND<.5 THEN 360 ELSE 330
380 CALL SOUND(-4000,-3,0,400,0)
385 FOR DEL=1 TO 1500 :: NEXT DEL ::RUN
390 STOP
400 SUB INSTRUCTIONS(PN) :: CALL CLEAR
410 DISPLAY AT(1,8):"TARGET" :: DISPLAY AT(2,8):"======"
420 DISPLAY AT(5,1):"USE ANY KEY TO DROP BOMB."
430 DISPLAY AT(9,1):"CHOOSE OPTION PLEASE"
440 DISPLAY AT(13,1):"EASY OPTION";TAB(26);"(1)"
450 DISPLAY AT(15,1):"HARD OPTION"
460 DISPLAY AT(16,1):"(NEGATIVE SCORING)";TAB(26);"(2)"
470 CALL KEY (0,KY,ST):: CALL SOUND(-20,900,20):: IF ST=0 THEN 470
480 IF KY=49 OR KY=50 THEN PN=KY-49 ELSE 470
500 SUBEND
600 REM *******
601 REM LINES 150 TO 210 DEFINE CHARACTERS .. EXPERIMENT HERE!
610 REM A1$.. PLANE
620 REM A2$.. TANK
630 REM A3$.. ROAD
640 REM A4$,A5$,A6$.. EXPLOSIONS
650 REM A7$.. BOMB
660 REM A8$,A9$..BUILDINGS
670 REM *******
680 REM SPRITE #2..PLANE
690 REM SPRITES #4,#5,#6..TANKS
700 REM SPRITE #3..BOMB
710 REM *******
720 REM INCREASE DIFFICULTY LEVEL BY INCREASING SPEED OF SPRITE(#2)
725 REM ALSO HEIGHT OF BUILDINGS CAN BE CHANGED IN LINE 240
726 REM TANKS CAN BE SPEEDED UP OR SLOWED DOWN IN LINES 265 AND 266
730 REM ARRAY 'A()' KEEPS CHECK OF HEIGHT OF EACH BUILDING
740 REM AS AN ALTERNATIVE TO 'RUN' IN 385 YOU CAN CHECK FOR HIGHEST SCORE TO
750 REM DATE ..HIGHEST=MAX(SC,HIGHEST) AND GOTO 240 . HIGHEST SCORE CAN THEN
760 REM BE DISPLAYED
800 REM ALL REMS MAY BE DELETED
900 END
READY.
```

TARGET

RUNS ON A TI 99/4A IN 16K BY R. MATTHEWS

You are the pilot of a jet fighter on a kamikaze mission. Your task is to bomb a city occupied by enemy troops and cause as much destruction as possible before your jet crashes into the flaming ruins. Enemy tanks are racing through the city streets and these must also be destroyed before they manage to find shelter. They can only be hit when your bombs have cleared gaps in the buildings.

But all the time you are blasting away at the city below your jet is losing altitude — and it's only a matter of time before it crashes — so you have to move fast to complete your mission.

Program notes: A1$ to A9$ define character shapes. Miskeying will not affect the running of the program — but it will produce some odd shapes! A variable A(31) is defined twice in line 130. This is unnecessary and one of them may be deleted before copying.



Illustration: Jon Davis

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PUZZLING

BY TREVOR TRURAN

CAN YOU STEM THE ALIEN TIDE?

If all the arcade aliens were joined tentacle to antenna the line would stretch very nearly from Hazelbury Plunknett to furthest Wollumboolawonga.

The link can be completed provided you and your trusty laser can give the deep fried treatment to these, the latest misguided monsters who have crossed the Cosmos in the belief that Earth is their new paradise.

The puzzle can be solved by hand and brain right here on the page (may we recommend a piece of thin paper laid on top, so that several attempts can be carried out?) or a program can be written which will achieve the task in the most efficient manner.

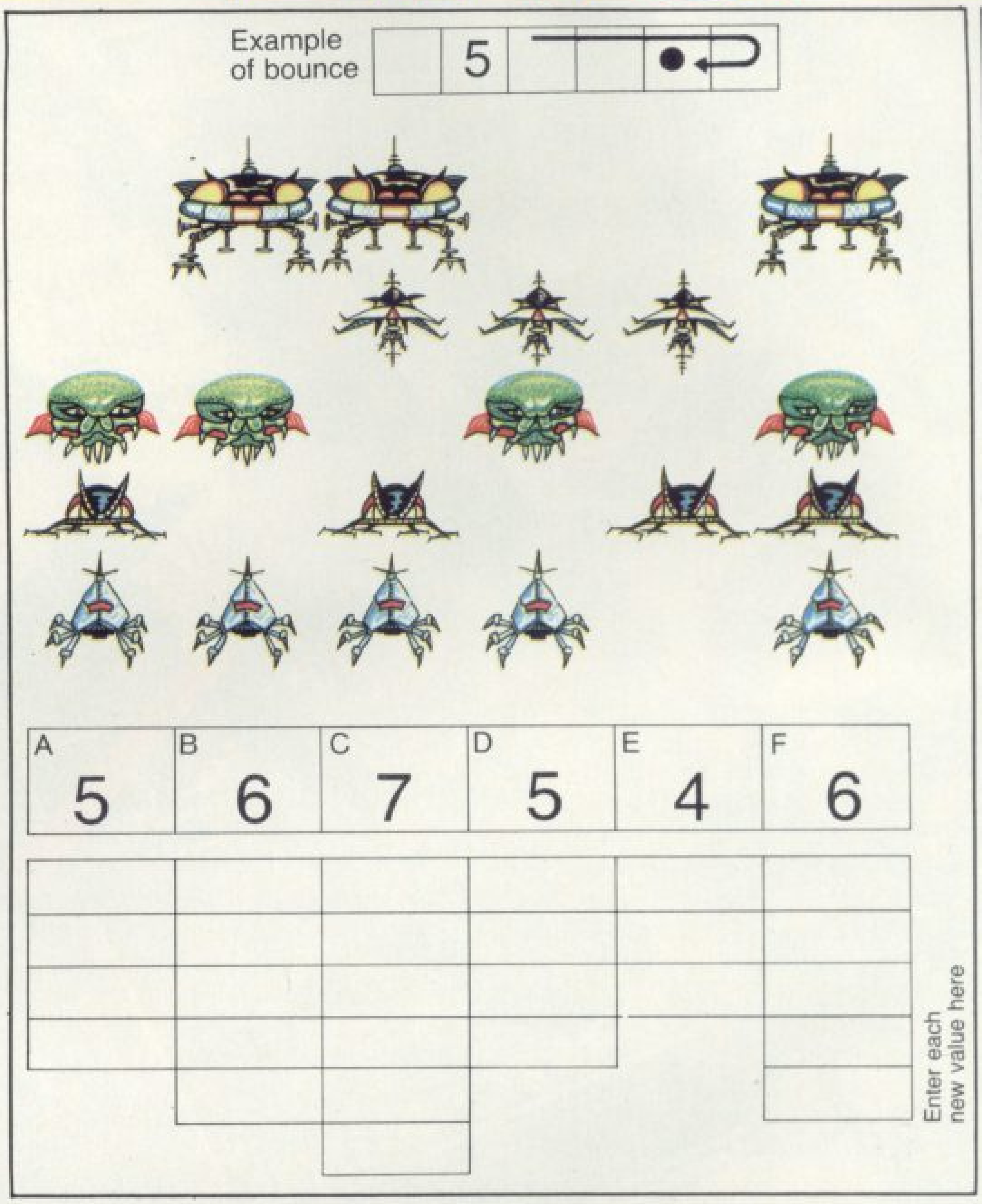
To begin: place your gun on any of the firing positions A to F and loose off a shot. This, as in all future firings, will have two effects: One alien lying on that vertical line will be destroyed and that firing position will have its value (shown by the number) reduced by one. Enter the new value in the grid below the firing range and prepare to move.

After each shot you must move your gun the distance in squares equal to its current value. You can move to right or left but must proceed in one direction unless the value of the square would take you beyond the firing range.

In this case you "bounce" back from the end square, as our sample picture shows.

At the end of your move you must fire the laser and reduce the value of that square by 1 even though there may be no aliens to shoot at. You must be sure never to land on a square and reduce its value to zero as you will then be stuck and the rest of the gang will land — with consequences dire to the future of the human race.

True success will only come if you can complete the task in the lowest possible number of moves.



Remember this is no easy entanglement with a bunch of alien E.T. wets, but the future of this very Earth is at stake. Realising the gravity of the situation, the editor of this magazine feels prompted to reward three space-war heroes who find the correct solution.

Try a few rough attempts first to work out how the aliens move.

Send your lowest solution to: Space Attack Competition *Computer & Video Games*, Durrant House, 8, Herbal Hill, London EC1R 5JB, before January 12. The first three out of the hat will win hand-held space invader machines.



If you can beat the Puzzling pages' space invaders, then you could have a chance to tackle invaders on the Galaxy Invader 1000.

Three of Computer Games Ltd's hand-held space invader games are up for grabs for the first three answers with the best solutions out of the hat.

The Galaxy Invader has three skill levels, two colour graphic display and scores up to 999 with extra missile stations for scores over 700.

Make sure your entry is with us before January 12th 1983.

DEFEAT THIS WORDY HORROR

This relic (right) from the primordial past is in urgent need of taming before it leaves its dark unfathomed cave and starts chewing up fair damsels, post office towers and Clive Sinclair.

To do this, drop one letter from those used in the line above and arrange the remaining letters to form a word or words.

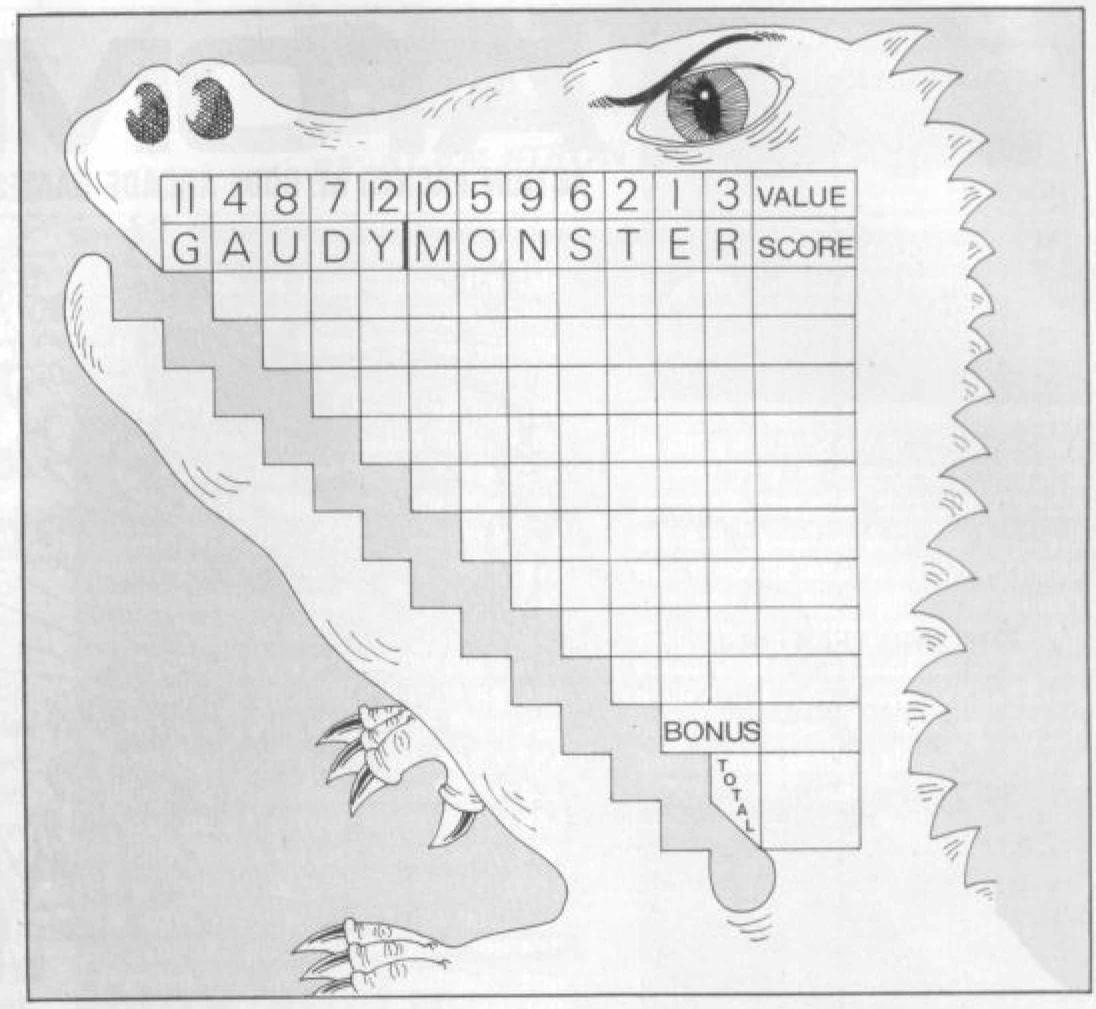
Words, to be valid fodder for our toothsome fiend, must be of three letters or more and must be bold type entries in *Chambers's Twentieth Century Dictionary, Revised Edition*.

Words must not overlap along the line and must be separated by a bar. A word once used must not be repeated on any subsequent line.

Each line scores the total of all the letter values which appear in it. The letter values are shown above the top line. So keeping "Y" in is worth extra points.

A bonus can be scored for each word which is of five or more letters and is equal to the length of the word; a five-letter word gains five extra points and so on.

When you have entered the score for each line add on the sum of your bonuses to give the final grand total — the greater that is, the more peaceful the leviathan.



UNSCRAMBLE THE ONMIDOSE

This somewhat bizarre title is a direct indication as to just what is the problem below — dominoes have been scrambled.

Not that the event caused any grief to Ephraim Wheel, rather the opposite.

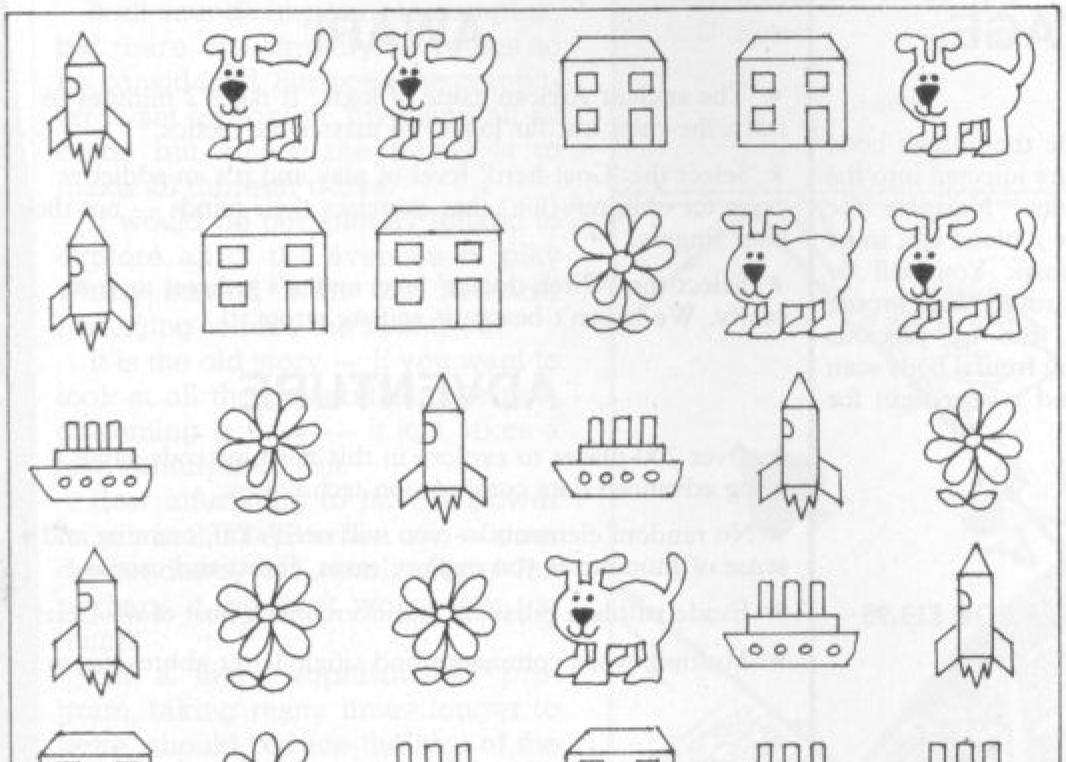
He was so delighted that his daughter, Daisy, had managed to arrange her complete set of picture pairs into a six by five rectangle that he quickly drew the layout for posterity.

It mattered not that the girl had paid scant regard to the usual rule that adjacent dominoes should have the same picture touching, at a few days over 18 months, it was a miracle to the proud father that geometric genius had manifested itself at so early an age.

Hence, as we have remarked, the quick drawing . . . Too quick, in fact, as Ephraim has omitted the lines which show the separate dominoes.

It is not too difficult a task to find the unique way in which the cards were laid out, bearing in mind that with 5 different pictures, all the different arrangements of possible pairs are present somewhere.

Can you draw the dividing lines and so complete the picture for Ephraim?



The solutions to these two puzzles and the winners of our November Mastermind competition can be found on page 11 of this issue. Try them before you look out an answer.

BRIDGE

BY ALAN HIRON

DEALING WITH THE DOUBLE-DUMMY POSER

In my last article I talked about the possibilities of running an exhaustive search to tackle the play in the sort of bridge problem where 'you can see all four hands — the so-called — or rather misnamed — double-dummy problem.

As I had suggested, if the problem involves only five or six cards per player, then absolutely all the legitimate sequences of play can be inspected. As soon as you advance to larger numbers of cards (like thirteen per player?) then the computation becomes too massive for present day machines, even huge main-frames let alone a personal machine. And I am looking on the bright side!

The sort of problem that comes along in real life involves you — as declarer — seeing only dummy. If asked how best to play the hand, an exhaustive search would involve creating and testing all possible ways of distributing the opponents' twenty-six cards between them!

It all sounds impossible complex, but there are simplifying routes to be considered. Suppose the computer is set a problem involving all 52 cards but where the target is to make all thirteen tricks.

It would be completely lunatic to explore all of the avenues of play which started with the declarer managing to lose the first trick.

It is the old story — if you want to look at all the possibilities the programming is easy — it just takes a few centuries to run.

How infuriating to have a power failure in 2342 AD when one of your descendants was nearly there! But perhaps it wouldn't worry you too much!

But a more sophisticated program, taking many times longer to write, should reduce the size of the calculation by several, indeed many, orders of magnitude.

Try this very simple example — a double squeeze in a three-card ending:

	S A 3 H K D none C none	
S K J H A D none C none		S Q 10 H none D A C none
	S 2 H none D K C A	



With South on lead and clubs as trumps it is easy for the human — play the Ace of Clubs.

If West discards HA you are home and dry. So West parts with SJ, dummy with the new useless HK and now East is squeezed.

Here it was relatively easy to look at all the possibilities as they were as few.

But as South required *all* the tricks, it would be time-wasting to examine all the sequences of play starting with a low spade from both South and North.

You see the point? Far more programming but less computation.

You can try to be too sophisticated. You remember the story of the chess computer that made a silly looking move, watched by and sneered at by many top-ranking human players?

Only later analysis proved that the machine was right in the sense that any alternative would have lost more quickly.

Who knows? Maybe exhaustive searches will still produce hitherto unknown and exciting plays on the bridge scene. Watch this space. *Computer and Video Games* hopes to bring you them first!

Perhaps your bridge memories don't go back as far as mine but in the late 1930's Ely Culbertson sponsored Auto-Bridge. In other words, bridge for one player.

The idea was neat and simple — you slipped one of a number of master charts into a flat container with a number of metal hatches on the top, you opened your thirteen hatches and saw your hand. You decided on a bid, you opened another hatch to see if you had made the right bid.

If you hadn't, you read the manual to see where you had gone wrong and made the right bid instead. Then you opened your left hand opponent's first bidding hatch, found out what he had done, looked at your partner's bid and then your right hand opponent's bid. Now your next decision — right, carry on; wrong, correct — and so on.

Then the play started after you had reached the approved contract. You opened the first card hatch on your left and saw the opening lead, inspected dummy — thirteen more hatches to open. You carried on, logically enough, by deciding on your play to each trick before opening the appropriate hatch to see if you were right or wrong.

I suppose it might have been thought of as the Charles Babbage contribution to computerised bridge.

Now back to the 1980's. After the personal computer that *plays* bridge, came a logical step. If you have your own machine then for a relatively small sum you can buy a plug-in addition to your store — ROM, of course — that contains the raw material of a large number of hands, rather exciting colour graphics, sensible bidding for the hands and sensible play.

The plug-in board — produced by Intelligent Software for Tandy or compatible machines — doesn't *play* bridge — it just sees if you can, for it knows the hands and has been pre-programmed to cope with whatever you try.

The release date is December 1. More details when I have had a chance to play with the package more thoroughly.



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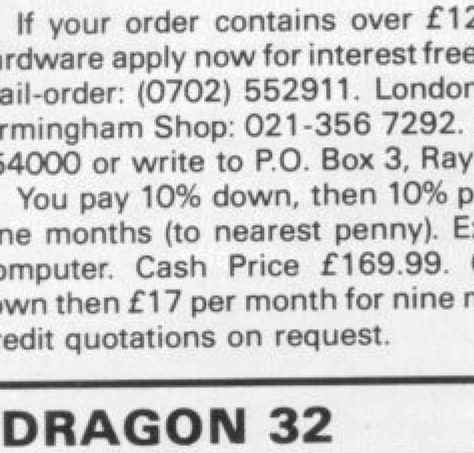
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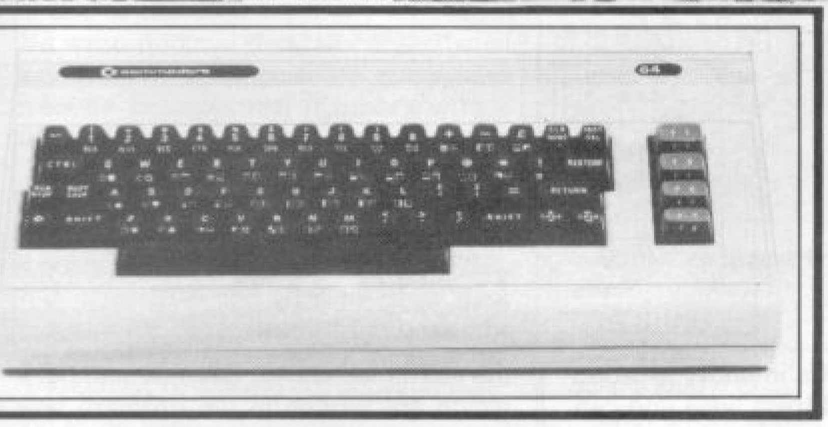
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MACHINE CODE

LEARNING A NEW LANGUAGE . . .

We have already looked at some background material on binary numbers and the structure of a computer system. Although there will be more of this background material later on, this month we will be dealing with microprocessors and some, simple assembly language instructions.

To understand assembly language we need to look inside the microprocessor. Figures 1, 2 and 3 show the *internal registers* (memory locations and working storage) of the 6502, 6809, and Z80 processors.

Some registers hold an eight-bit binary number and others a 16-bit binary number, and all instructions use or operate on the contents of at least one register.

There are many differences between the three processors in the number, names and uses of the registers, but there are similarities among the main registers.

The Program Counter, PC, keeps track of the address of the instruction currently being executed, and is updated automatically every time an instruction is executed.

The Stack Pointer (S in the 6502 and 6809, SP in the Z80) is used to keep track of subroutine calls and returns.

Although these registers are very important in the operation of the processor, they can be ignored in elementary programming.

The most important registers to the programmer are the accumulator, A (or two very similar accumulators A and B in the 6809) and the flags (called P for Processor Status Register in the 6502, CC for Condition Code Register in the 6809, and F for Flags in the Z80).

The accumulator is used for performing arithmetic and logical operations, and although some of these operations can be carried out in other registers there are some operations which can only be carried out in an accumulator.

The flags record information about a binary number or about the result of a calculation, and are used in binary arithmetic and in conditional jumps (the equivalent of IF . . . THEN GOTO . . . IN Basic).

The other registers differ greatly between the three processors, and will be introduced slowly throughout this series

The first instructions we are going to look at move data between the registers and the memory. You will remember

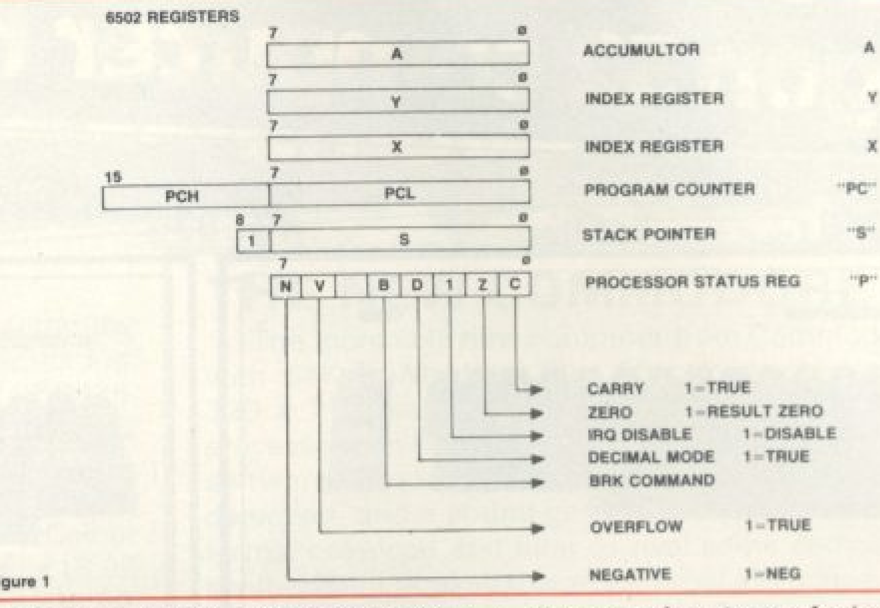


Figure 1

from last month that a memory location is selected by 16 address lines and can be specified by a 16-bit binary number (equivalent to a hexadecimal number from 0 to FFFF or a decimal number from 0 to 65535) and each memory location contains eight-bits of data (equivalent to a hexadecimal number from 0 to FF or a decimal number from 0 to 255).

Because the assembly languages are so different we will look at the processors individually.

THE 6502 AND MNEMONICS . . .

The 6502 uses the mnemonics LDA, LDX, LDY (LD being an abbreviation for load) in instructions that fetch data from memory into the registers A, X, Y, and STA, STX, STY (ST being an abbreviation for STore) in instructions that fetch data from the registers into memory.

As well as the opcode mnemonic we need an operand to indicate the memory location involved. The 6502 has several *addressing modes*, which are methods of specifying the memory location or register involved in an instruction, and we will begin by looking at two of these addressing modes, *immediate* and *absolute*.

In immediate addressing the actual data is included in the instruction, and a hash sign, #, is placed in front of the data to show that it is immediate data. Thus, we may write:

```
LDA #22
LDA #$16
LDX #$10
LDY #$10
```

The assembly language allows us to use several different notations for writing numbers. Two of these are shown in the examples above; decimal numbers, which are written in the ordinary way with no distinguishing marks, and hexadecimal, which are distinguished by being preceded by the dollar sign, $. Thus 22 and $16 represent the same number.

Note that, because the registers A, X and Y contain eight-bits the operand in an immediate mode instruction must be an eight-bit number (0 to FF hex, or 0 to 255 decimal).

The result of these instructions is to replace whatever was in the register by the value specified in the instruction. Obviously, we cannot use immediate addressing with the store instructions STA, STX, STY, because there is nothing to tell us where to store the number.

In absolute addressing we specify a memory location. The load instructions the contents of the memory location into a register, and the store instructions put the contents of the register into the memory location.

The instruction LDA $1000 takes the eight-bits from memory location 1000 hex and puts them into the accumulator, while STX $1000 takes the eight-bits from register X and puts them into memory location 1000 hex. Note that we need four hex digits to specify an address.

There are also instructions to move data between the registers: TAX (Transfer contents of A to X), TXA (Transfer contents of X to A), TAY (Transfer contents of A to Y), and TYA (transfer contents of A to Y).

In all these instructions only the destination (register or memory location) is changed; the source data remains the same. Thus, LDA $1000 leaves the contents of memory location $1000 unchanged, STX $1000 leaves the contents of the X register unchanged, and TYA leaves the contents of the Y register unchanged.

BY TED BALL

GETTING FAMILIAR WITH THE 6809

The 6809 assembly language is very similar to the 6502 assembly language. We write decimal numbers in the usual way with no distinguishing mark, and precede hexadecimal numbers with a dollar sign.

We have the opcode mnemonics LDA, LDB, LDD, LDU, LDS, LDX, and LDY to load data from memory into the processor registers, and STA, STB, STD, STU, STS, STX and STY to store data from the processor registers into memory. The mnemonic must be followed by an operand to specify the memory location to be used.

Like the 6502, the 6809 has a number of *addressing modes* which allow the memory location or register involved in an instruction to be specified.

The simplest addressing modes are *immediate addressing* where the data is contained in the instruction, and *extended addressing*, where the memory location to be used is contained in the instruction.

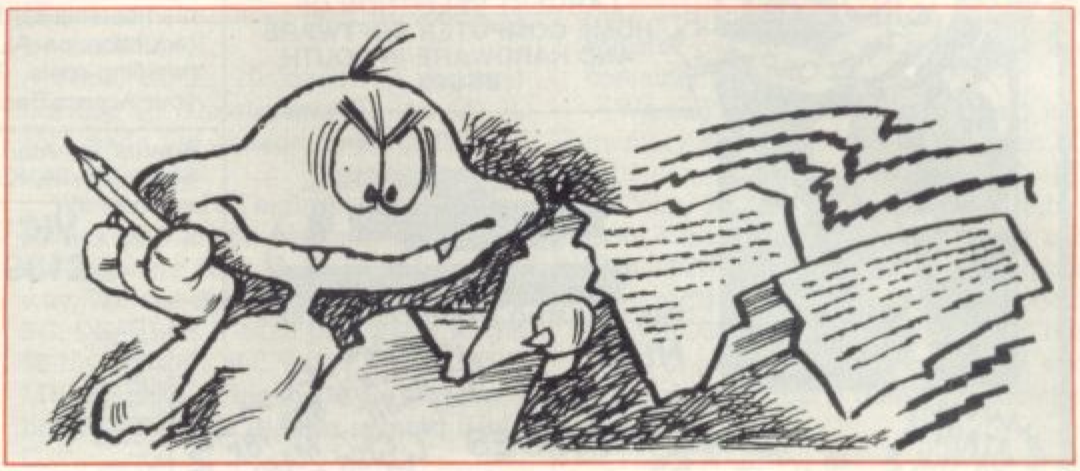
Examples of immediate mode instructions are
LDA #22
LBD #$16
LDD #$1234
LDX #$1000

The hash sign is used to indicate immediate addressing; decimal numbers are written with no distinguishing sign, and hexadecimal numbers are preceded by the $ sign. Thus LDA #22 means "load the decimal number 22 into accumulator A", LDB #$16 means "load the hexadecimal number 16 into accumulator B", and LDX #$1000 means "load the hexadecimal number 1000 into register X".

The two accumulators, A and B, each contain eight-bits, so the operand must be an eight-bit binary number (equivalent from 0 to 255).

The 16-bit accumulator D is actually the two eight-bit accumulators combined, with A being the high order part and B being the low order part; the instruction LDD $1234 thus means "load the hexadecimal number 12 into accumulator A and load the hexadecimal number 34 into accumulator B".

The operand in a LDD instruction must always be a 16-bit number, and if we were to write LDD 1, the result of this instruction would be to put 0 in A and 1 in B. The registers U, S, X, Y, are 16 bits long and take a 16 bit immediate operand.



Some extended mode instructions are:
LDA $1000
LDD $1000
LDY $1000

LDA $1000 takes the eight-bits from memory location 1000 hex and loads them into accumulator A. A 16-bit load instruction cannot, of course, take 16-bits from an eight-bit memory location, so it uses two consecutive eight-bit memory locations.

Thus LDY $1000 loads the Y register with the contents of memory locations $1000 and $10001, the contents of location $1000 becoming the high order part of Y and the contents of $1001 becoming the low order part of Y.

Similarly, LDD $1000 loads the contents of location $1000 into A and the contents of $1001 into B.

The store instructions in extended mode work in the opposite direction from the corresponding load instructions.

Thus, STA $1000 puts the eight-bits from accumulator A into memory location $1000, STD $1000 puts the eight-bits from A into memory location $1000 and the eight bits from B into memory location $1001, and STU $1000 puts the 16-bits from U into memory locations $1000 and $1001.

We cannot use immediate addressing with store instructions, as this is meaningless.

As well as the load and store instructions, which move data between registers and memory we have the TFR and EXG instructions which move data between registers.

The operand with these instructions has the form r1, r2 where r1 and r2 may be any two registers of the same length.

Thus we can write TFR A, B which transfers the contents of A to B leaving

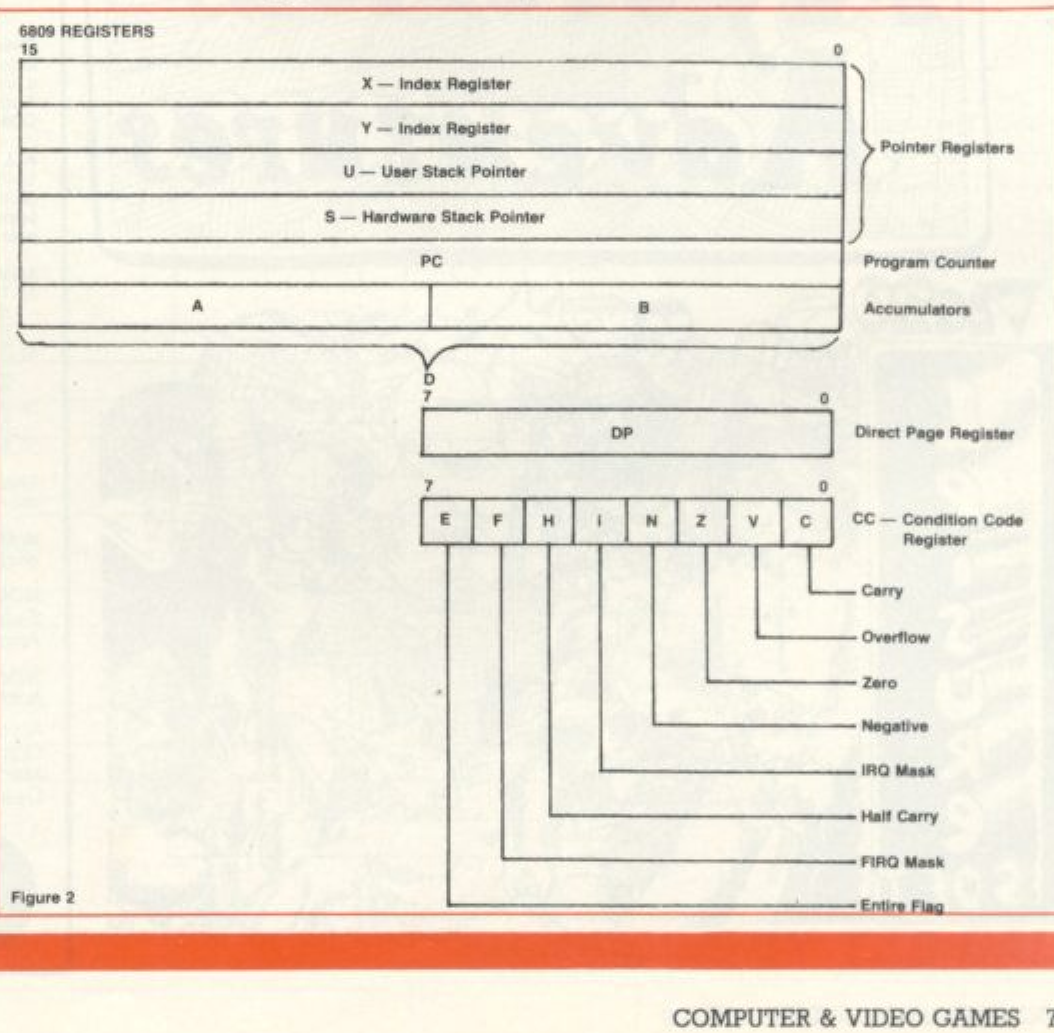


Figure 2

A unchanged, or TFR X, Y which transfers the contents of X to Y leaving X unchanged, but we cannot have TFR A, X because A is an eight-bit register and X is a 16 bit register.

Similarly, we can write EXG A, B which exchanges the contents of A and B, or EXG U, Y which exchanges the contents of U and Y, but not EXG A, U.

THE REGISTERS IN THE Z80

If you look at figure 3, showing the registers in the Z80 you will see that there are a total of 22 registers. We are not going to look at all these at once, but we will begin with the most important the accumulator A, and the registers B, C, D, E, H and L.

The instructions to move data from memory to registers, from registers to memory, and between registers all have the form LD destination, source.

There are several ways of specifying the destination and source, leading a number of different groups of LD instructions.

We can load data directly into a register by an instruction like LD A, 10 or LD H, 15H. Note that a decimal number is written in the normal way, while a hexadecimal number must be followed by the letter H.

Thus, LD A, 10 loads the decimal number 10 into register A, and LD H, 15H loads the hexadecimal number 15 into register H.

We can load an eight-bit number (0 to FF hex or 0 to 255 decimal) into any of the registers A, B, C, D, E, H, L, in this way. We can also treat the register pairs BC, DE, HL as if each pair was a single 16-bit register, and write, for example, LD BC, 1000H. This loads the hex number 10 into B and the hex number 0 into C.

We can also load a register or register pair from data in memory. Thus, LD A, (1000H) loads the eight-bits from memory location 1000H into the accumulator A.

When we load a register pair from memory, we must, of course, use two memory locations. LD HL, (1000H) loads the contents of memory location 1000H into register L and the contents of memory location 1001H into register H.

Note that the high order part of the register pairs BC, DE, HL is B, D, H and the low order part is C, E, L, respectively, but when we load two memory locations into a register pair the order is reversed.

If we have 34H in memory location 1000H and 12H in memory location 1001H, the instruction LD BC, (1000H) puts 34H in C and 12H in B, but the register pair BC will be treated as if it contained 1234H.

We can store data from registers into memory by instructions of the form LD (1000H), A or LD (1000H), BC. LD (1000H), A puts the eight-bit number from A into memory location 1000H, and LD (1000H), BC puts the 16-bit number from register pair BC into memory locations 1000H and 1001H, with the 8 bits from C going into location 1000H and the eight-bits from B going into location 1001H.

There is also a group of instructions of the form LD register 1, register 2 which move data between eight-bit registers; for example LD A, C moves the contents of C into A.

However, we cannot move data from one register pair into another register pair in a single instruction; if we wish to copy the data from BC into DE we must use two instructions, LD D, B and E, C.

A very important form of the LD instruction uses a register pair as a pointer to a memory location. For example, if HL contains 1000H (10H in H and 00H in L) the instruction LD A, (HL) puts the contents of memory location 1000H into the accumulator A, and the instruction LD (HL), A puts the contents of A into memory location 1000H.

Next month we will continue by looking at arithmetic instructions.

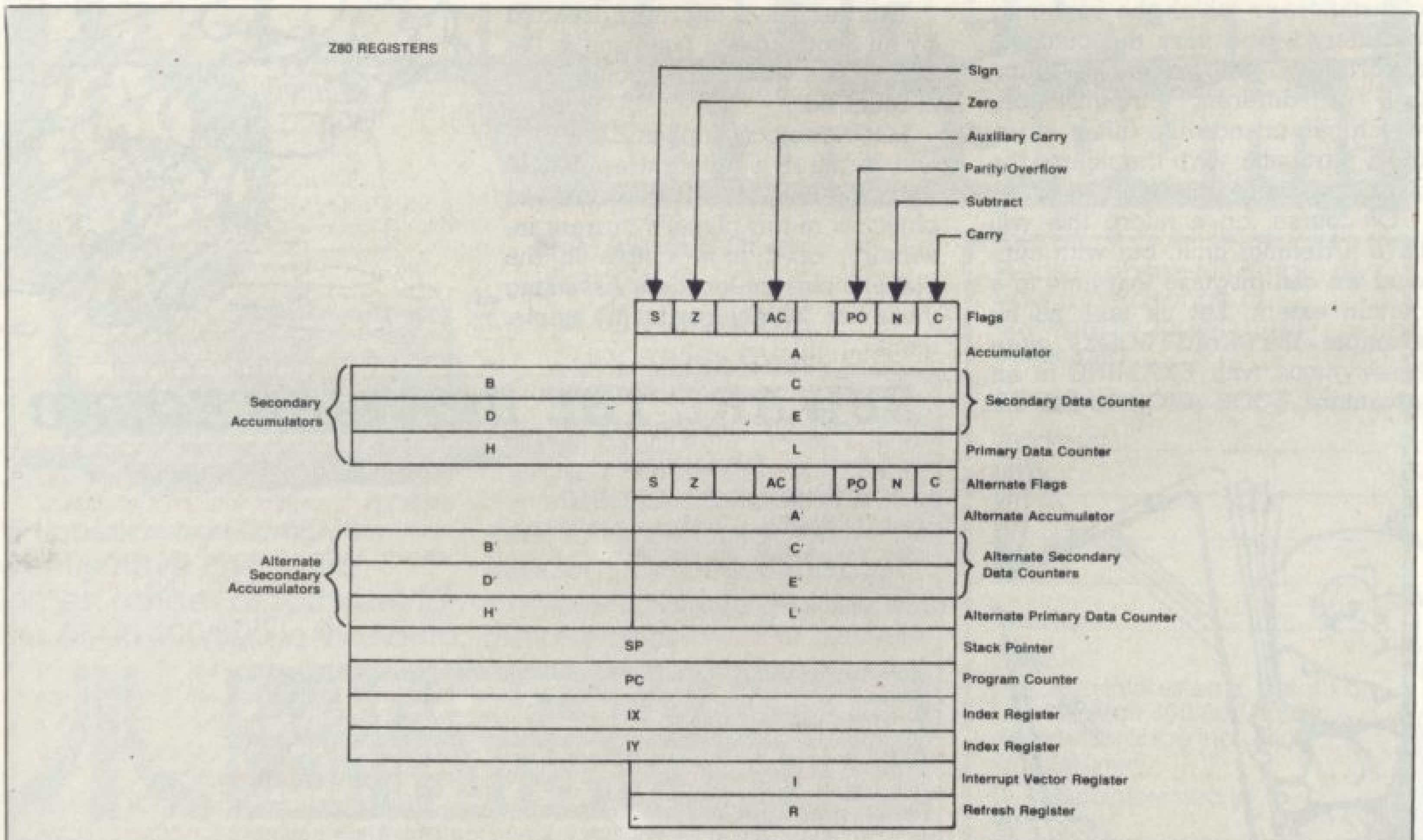


Figure 3

BY TED BALL

Adventure

PLOT OF THE GAME OF THE BOOK . . .

An adventure game is very similar to a story in that it must have a theme. The extent to which the game differs from a book is the degree of interaction with the plot.

This can vary from the player having no choice but to guess or deduce the correct commands, to allowing multiple choices of action at every turn.

In other words, the plot may branch endlessly. In a book, the outcome is fixed. In real life there is an infinite choice of actions, each with vastly differing results. An adventure game falls between these two extremes.

Perhaps this explains the popularity of Adventure, it is fiction in which the reader participates and affects the outcome.

Depending on the player's actions he can change the storyline to a certain extent.

A verb is the key to an action. We can look at all the different circumstances in which the verb may be uttered, and vary the outcome accordingly. The greater the number of different circumstances which can change the effect of using a particular verb the nearer the game will be to real life.

Of course, on a micro this will have a definite limit, but with cunning we can disguise that limit to a certain extent. Let us take as an example the word LOOK, often synonymous with EXAMINE in an adventure. LOOK AROUND has the potential to produce a different reply for every location, and then some more, giving additional clues about hidden features, such as a secret exit, whilst LOOK HOLE may produce a reply like "I see a bottle of rum".

It may be arranged for the bottle to then be displayed as a normal visible object.

The outcome of the game will be affected, since it might be that without the rum a pirate will not be so helpful, and this might eventually be crucial to the game.

The program code to achieve these multiple replies can be relatively short:

```
3999 REM ***** LOOK (EXAMINE) *****
4000 IF K2 <> (code for AROUND) THEN 4500
4010 ON PN GOTO 4100,4110, 4120,4190 . . . etc.
4100 LET Q1$ = "THERE'S A BOAT ON THE HORIZON" : GOTO100
4110 LET Q1$ = "I SEE A SECRET PASSAGE" : GOTO100
4120 . . . . etc.
4190 LET Q1$ = "I SEE NOTHING SPECIAL" : GOTO100
```

This last line is the reply dreaded by all Scott Adams fans, and is the default line where no specific reply is required.

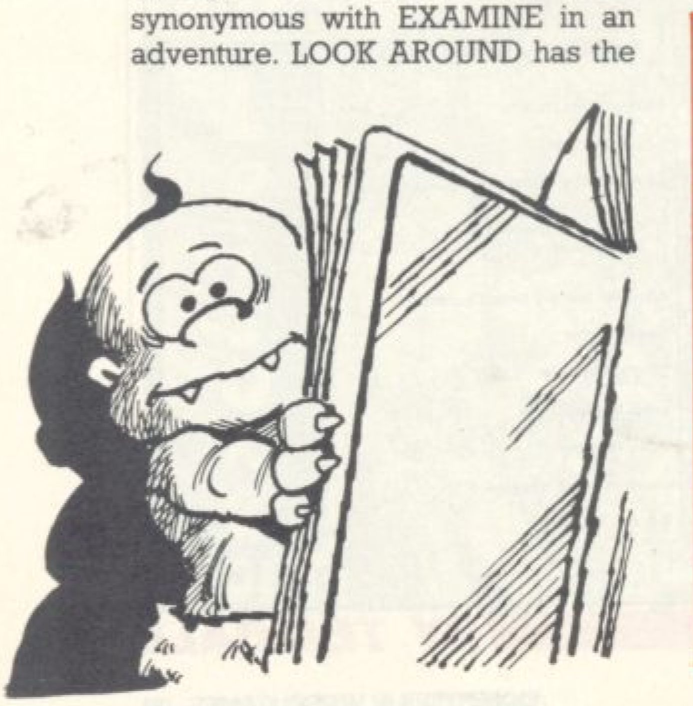
LOOK (object) implies EXAMINE and requires a different approach. First we must check whether the object is in the player's current inventory, or if it is visible in the player's current location. Assuming there are 30 objects in the game, then:

```
4500 IF K2 > 30 THEN 4800 : REM SUBSCRIPT IN RANGE FOR 4510
4510 IF P(K2) <> 50 AND P(K2) <> LN THEN LET Q1$ = "I DON'T SEE IT HERE" : GOTO 100
4520 ON K2 GOTO 4530,4190, 4540,4190,4550 . . etc.
4530 LET Q1$ = "IT SAYS: BEWARE THE SLEEPING DRAGON": GOTO1000
4540 LET Q1$ = "THERE ARE 2 LEVERS — RED & GREEN" : GOTO100
4550 . . .etc
```

Note the use of the existing default line to avoid writing it twice. Line 4500 checks that K2 isn't greater than the highest permissible subscript set by the DIMension of the array P.

You can thus see that the limit to the different response to LOOK are set only by the computer memory available and the author's imagination!





BEWARE THE RIGELIAN HOUND

Strange Odyssey is yet another of Scott Adams' offerings, and has a science fiction theme. The hardy adventurer finds himself in a broken down spaceship somewhere on the surface of the moon.

A good space traveller will of course know what precautions to take and how to use low gravity to advantage. A good adventurer will need similar insight!

Armed with a phaser it is quite likely that the explorer will come to an alien room and discover the way to travel to strange worlds. He might visit, for example, an intergalactic zoo and become the prey of a Rigelian dia-ice hound — not a beast to endear itself to any but the most devoted of dog-lovers!

Or he might get trapped in a methane snow storm and run out of oxygen. The object is to collect treasures of ancient alien civilisations and store them — where? Ah-ha! Can you get there? Can you mend your crippled ship? And can you climb slime trees?

This game, as might be expected from Scott, is not easy, but it is fun. It simulates many features from science fiction books and movies — if you are a science fiction fan you should find your way around easily enough!

Strange Odyssey is written in machine code, and versions are available for the TRS-80, Video Genie, Apple, Sorcerer and Atari computers. Thanks to Mr. Harding of Molimerx for the review copy.

BY KEITH CAMPBELL

NEW

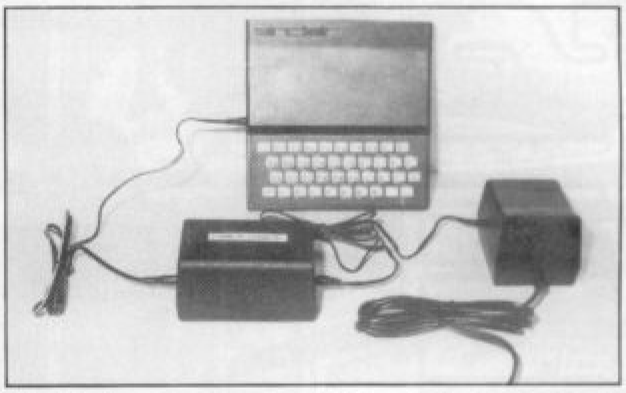
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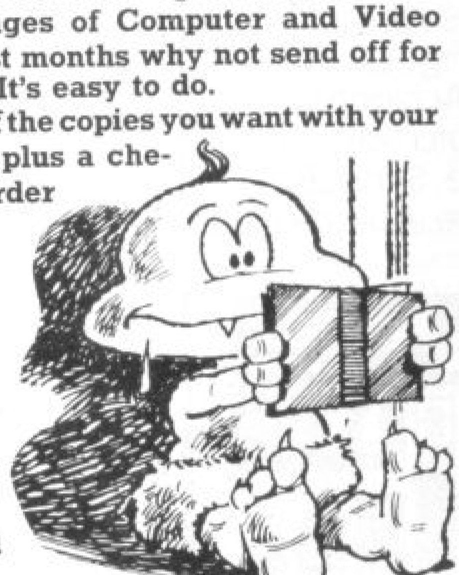
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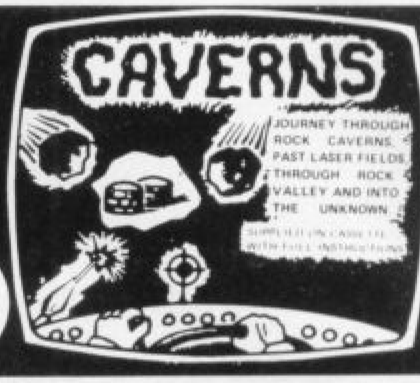
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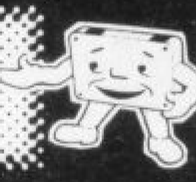
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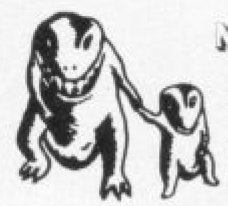
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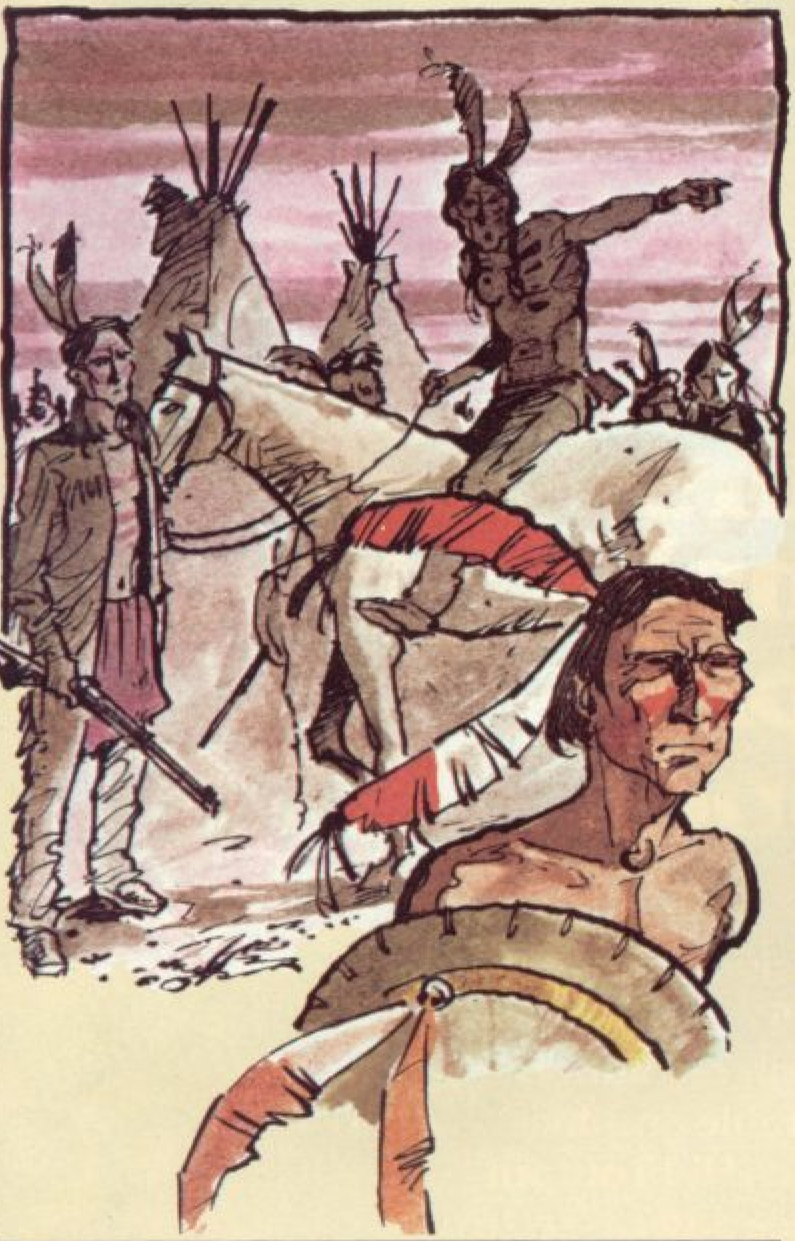
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```
10 GOTO760
190 R=PAND255:POKEU,R:POKEU+1,(P-R)/256:RETURN
390 SP=USR(ML+O):RETURN
430 PRINT@896,CHR$(31);:PRINT@896,"";:RETURN
440 X=PEEK(VARPTR(X$(V))+2)*256+PEEK(VARPTR(X$(V))+1):RETURN
760 CLEAR100:P=27300:U=16561:GOSUB190
770 CLEAR100:CLS:DEFINTB,I-V,X-Z:DEFSTRA,C-H:DEFDBLW:RANDOM
790 GOSUB1540
791 GOSUB3000     'DELETE LATER
820 CLS:GOSUB1100:PL=1
821 GOTO2500     'DELETE LATER
860 RETURN   'STUB
950 RETURN   'STUB
1100 N9=27701:BD=31669:S9=32605:RW=S9+1:RU=RW+12:SK=27531:SS=275
26:SB=27522:TB=27344
1110 POKERU,205:V=2:GOSUB440:U=RU+1:P=X:GOSUB190:POKERU+3,201:I=
RU+4
1140 V=1:GOSUB440:B1=X:U=X+196:P=RU:GOSUB190:U=U+22:GOSUB190
1160 V=3:GOSUB440:U=16526:P=X:GOSUB190:K9=USR(0)
1170 CLS:Z=128:GOSUB950:GOSUB860:RETURN
1540 X$(1)="AAAAAAAAAABBBBBBBBBBCCCCCCCCCCDDDDDDDDDDEEEEEEEEEEFF
FFFFFFFFGGGGGGGGGGHHHHHHHHHHIIIIIIIIIIJJJJJJJJJJKKKKKKKKKKLLLLLL
LLLLMMMMMMMMMMNNNNNNNNNNOOOOOOOOOOPPPPPPPPPPQQQQQQQQQQRRRRRRRRRR
SSSSSSSSSSTTTTTTTTTTUUUUUUUUUUVVVVVVVVVVWWWWWWWWWWYY"
1550 X$(2)="AAAAAAAAAABBBBBBBBBBCCCCCCCCCCDDD"
1560 X$(3)="AAAAAAAAAABBBBBBBBBBCCCCCCCCCCDDDDDDDDDDEEEEEEEEEEFF
FFFFF"
1690 RETURN
2000 'THE FOLLOWING CODE WILL EVENTUALLY BE DELETED
2499 'DEMONSTRATION DRIVER
2500 U=16526:P=B1:GOSUB190
2502 CLS:PRINT@20,"BIGSCREEN DEMO"
2505 FORML=476TO2632STEP88:O=1:GOSUB390:PRINT@SP,"";
2510 IFML>2000THENPRINTCHR$(140)+CHR$(191)+CHR$(191);
2512 IFML<1700THENPRINTCHR$(183)+CHR$(187)+CHR$(140);
2520 O=0:GOSUB390:NEXTML
2580 FORML=476TO2632STEP44
2586 GOSUB430:PRINT@896,"ML= ";ML;
2590 O=1:GOSUB390:FORJ=1TO100:NEXTJ
2600 IFINKEY$>""THENEND
2610 NEXTML:GOTO2580
2998 '
2999 DATA MACHINE CODE
3000 DATA CD,7F,0A,E5,7D,E6,FE,6F,E6,7F,4F,CB,25,CB,14,44
3001 DATA AF,67,57,79,FE,1C,38,0B,FE,5C,30,0E,D6,18,5F,3E
3002 DATA 9C,18,0B,1E,01,1D,C6,84,18,04,1E,48,C6,3C,6F,78
3003 DATA FE,06,30,0C,D5,16,01,15,1E,40,19,10,FD,D1,18,34
3004 DATA D5,11,40,01,19,D1,FE,19,38,19,D6,19,D5,47,16,01
3005 DATA 15,1E,40,19,10,FD,D1,E5,26,0A,2E,01,2D,19,E5,D1
3006 DATA E1,28,11,D6,05,47,E5,D5,E1,16,01,15,1E,80,19,10
3007 DATA FD,E5,D1,E1,7C,E6,0F,67,C1,E5,D5,21,35,6C,19,EB
3008 DATA 79,E6,01,21,84,3C,06,0B,C5,06,01,05,0E,38,B7,28
3009 DATA 01,EB,ED,B0,28,01,EB,06,01,05,0E,08,09,06,48,13
3010 DATA 10,FD,C1,10,E3,E1,06,07,AF,CB,1C,CB,1D,CB,1F,10
3011 DATA F8,06,03,CB,3F,10,FC,E5,01,30,0E,21,45,3C,16,03
3012 DATA 1E,01,1D,CD,6A,7F,23,23,23,10,F8,E1,7D,06,0B,0E
3013 DATA 30,21,81,3C,16,01,15,1E,3C,CD,6A,7F,16,01,15,1E
3014 DATA 3F,19,10,F3,E1,C3,9A,0A,XX
3015 DATA C5,3C,F5,06,01,05,FE,0A,38,05,D6,0A,04,18,F7,F5
3016 DATA 78,81,77,19,77,23,F1,81,77,37,3F,ED,52,77,F1,C1
3017 DATA C9,XX
3018 DATA 21,17,6C,11,18,6C,01,28,13,36,80,ED,B0,21,B5,7B
3019 DATA 11,B6,7B,0E,63,36,63,ED,B0,21,F9,7E,11,FA,7E,0E
3020 DATA 63,36,63,ED,B0,21,29,7C,06,1E,C5,06,08,36,63,23
3021 DATA 10,FB,0E,10,09,C1,10,F2,C9,XX
3500 RESTORE
3510 READM$:IFM$<>"MACHINE CODE"THEN3510
3998 '
3999 'LOADER
4000 LN$="..232 33 57"
4005 CS$="....21547 3810 5377"
4020 FORI=1TO3:J=VAL(MID$(LN$,3*I,3)):IFJ<>LEN(X$(I))THENGOSUB40
40:NEXTELSENEXT
4030 IFKTHENSTOPELSE5000
4040 PRINT"X$(";I;") IS ";LEN(X$(I));"CHARACTERS LONG -SHOULD BE
";J:K=1:RETURN
5000 FORI=1TO3
5020 CS%=VAL(MID$(CS$,5*I,5)):LN=VAL(MID$(LN$,3*I,3)):SUM=0:J=0:
V=I:GOSUB440
5030 READA$:IFA$="XX"THEN5120
5035 IFJ=LNTHENPRINT"TOO MANY DATA ITEMS ";:GOTO5047
5040 IF(A$<>"22")AND(LEN(A$)=2)THEN5050
5045 PRINT"ERROR IN DATA ITEM";J+1;
5047 PRINT"FOR X$(";I;")":STOP
5050 C%=ASC(LEFT$(A$,1))-48:B%=ASC(RIGHT$(A$,1))-48
5053 IFB%<0ORC%<0THEN5045
5055 A%=16*(C%+7*(C%>9))+B%+7*(B%>9)
5057 IFA%<1ORA%>255THEN5045
5070 SUM=SUM+A%:POKEX+J,A%:J=J+1
5110 PRINT@0,J;:GOTO5030
5120 IFJ<>LNTHENPRINT"TOO FEW DATA ITEMS ";:GOTO5047ELSEIFSUM<>C
S%THENPRINT"CHECK SUM ERROR ";:GOTO5047
5130 NEXTI
5150 RETURN
```

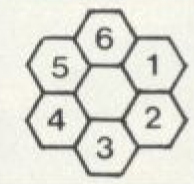


Figure 1:
The hex is the best servant of wargames whether they are on boards or computers as it overcomes the advantage of diagonal movement.

Illustrations: Jon Davis

Warpath is set in a Wild West scenario. A group of troopers are making their way through Indian country to relieve a beleaguered garrison. They win if their flag is carried successfully to the gates. The Indians, on the other hand, are intent on removing the garrison from their territory. They win by capturing either the garrison's headquarters or the flag.

Whilst the troopers have the greater firepower, this is matched by the increased mobility of the Indians so that the game is fairly evenly balanced. It is a relatively simple wargame. The rules, by modern wargame standards, are not complex but despite this it can produce interesting situations.

This is your chance to change history and be remembered as the hero that saved Fort Cheraqick! Or perhaps you would prefer to be known as the Indian Chief that saved the West and kept his tribe out of the reservations.

In this series of articles I am going to explain some of the techniques used to develop my wargames using Warpath as a typical example. Although it was written for the TRS-80 Level II, it is intended to provide sufficient detail to enable it to be modified for any computer. As we progress we will introduce the rules of play and list further routines until we have a complete wargame. As well as taking part in an interesting project, it is hoped you will find the ideas helpful in your own programming.

First, an explanation is necessary. Warpath contains 174 lines in multiples of 10 (i.e. from 10 to 1740). To avoid any subsequent confusion, every line will be printed exactly as it appears in the program. This will mean that occasionally lines will include references to subroutines which, if they are not relevant to the current article, are not listed. To ensure that the program runs properly without them, I have simply added a RETURN at the appropriate line with the remark, "STUB". See lines 860 and 950 for examples. These will eventually be filled out and completed.



WARPATH

More than just a wargame. Ron Potkin's series develops into a thrilling wild west conflict but also teaches some advanced programming techniques.

For those of you who are unfamiliar with wargames, let me first describe the hex. Most games are played on a board divided into squares so that pieces may move in four or, or if you include diagonals, eight directions. But squares are a problem in wargames because a piece moving diagonally will, in fact, move further than a piece moving, say, North or West.

This difficulty has been overcome by dividing a map into regular hexagons, or "hex" for short (see figure 1). Whilst the number of possible directions is reduced to six, you will see that all distances are equal. I have adopted the hex as standard in all my wargames with the exception of Turret and Track, which uses squares.

We are going to start by describing Bigscreen and Window. These are the basic elements of the program and were designed so that several wargames could be devised (*Kreigspiel II* and *Up Periscope!* use the same module). Instead of an area of 120 hex which fills the video screen, the map is held in a separate part of memory and only the relevant section appears on the screen. This large map is called Bigscreen and contains 31 rows of 128 print locations. The video is regarded as a Window looking over a portion of the map.

Bigscreen is an array of 3968 bytes and can hold a map of 496 hex (see figure 2). The numbers represent the first print position for the pieces. Figure 3 shows the layout of the Window. It starts at the print location 132 and consists of 11 rows of 56 bytes leaving room for messages and the map co-ordinates. It displays at any time an exact image of a portion of the map.

You should examine both arrays carefully and, in particular, note the way that the hex are laid out. We will discuss them in more detail later when we look at the movement of pieces. In a program of this nature many of the routines are concerned with searching the hex.

Right now we have to try and relate the Bigscreen positions to the Window. If a piece is at location ML on Bigscreen, how do we decide what part of the map should appear in the Window? In the wargame, it is desirable that the current piece being moved be in the centre of the Window so that it can "see" in all directions.

An algorithm is needed which, given ML — the location on the Bigscreen, will calculate: N7 — the address of the top-left corner of the selected rectangle, and SP — the position at which the piece will appear on the screen. Unless the piece is near the edge of the map, SP will be 476.

The following routine will perform these calculations:

```
Z=128:R=MLAND127:Q=INT(ML/128)
IFR<28THENSP=132+R:N7=0ELSEIFR
>92THENSP=60+R:N7=72ELSESP=156:
N7=R-24
IFQ<6THENSP=SP+64*Q:RETURNELSE
SP=SP+320
IFQ>24THENSP=SP+64*(Q-25):N7
=N7+2560:RETURNELSEN7=N7+Z*
(Q-5):RETURN
```

Looks complicated, doesn't it? Try it. Type the lines in, INPUT various values for ML and PRINT out the values SP and



N7. Most of the routine is spent checking to see if the piece is near the edge.

Once we have made the calculation, the correct part of the map is transferred to the Window and after we have carried out the player's move, the updated image is transferred back to the map. It is, of course, very important that we do not disturb ML during this process.

Unfortunately, transferring the map to the Window or copying the Window back to the map is very slow in Basic and so we must use machine language to perform these functions. Never used this before? Well, don't worry; I am going to make it as straightforward as I can so that you can't go wrong.

Strings are used in the program to save memory. Compared with DATA statements and other methods of using machine language in Basic programs, strings are very efficient in terms of convenience, time and space. In general, an 80% saving is realistic — you can see this by comparing the length of lines 3000 to 3021 with the length of lines 1540 to 1560 which will eventually contain the DATA. However, strings do have disadvantages: the lines containing them cannot be edited or listed and neither 34 nor zero should be used since these have special meanings to the Basic editor.

In the Basic listing that follows we shall use DATA to create a string of machine language and then delete it from the program. For those of you that want to understand the machine language contained in the DATA, a section of the coding which performs the algorithm above is shown in figure 4. You can see that the second column matches the DATA statements.

The program contains a loader which converts the code held in DATA statements to strings and a driver to demonstrate the Bigscreen routine. It is important to fill X$(1) with exactly 232 characters, X$(2) with 33 and X$(3) with 57. You will find that the editor will refuse to accept line 1540 in one shot (the limit is 240 characters including the line number), so type as much as you can and then enter the EDIT mode and press X. You will be able to add the additional characters at the end. Finally, make sure you save the program.

When you run it, there will be a pause while the strings are created. The program will stop if it discovers errors in the DATA lines. X$(3) is used to clear the Bigscreen by loading each byte with 128. Do not use the space (or 32) if you intend using graphics since you cannot manipulate the pixels. X$(1) is used to get the appropriate rectangle, a character is printed in the Window and then X$(1) is used again to put it back.

Finally, the Bigscreen with its contents and co-ordinates is scrolled across the Window. Press ENTER to stop the scrolling.

All lines up to 1740 which are multiples of 10 are extracts from the wargame. Eventually, all other lines can be deleted but we will keep them until all the strings are complete. Finally, here

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	0		8		16		24		32		40		48		56		64		72		80		88		96		104		112		120	
1		132		140		148		156		164		172		180		188		196		204		212		220		228		236		244		252
2	256		264		272		280		288		296		304		312		320		328		336		344		352		360		368		376	
3		388		396		404		412		420		428		436		444		452		460		468		476		484		492		500		508
4	512		520		528		536		544		552		560		568		576		584		592		600		608		616		624		632	
5		644		652		660		668		676		684		692		700		708		716		724		732		740		748		756		764
6	768		776		784		792		800		808		816		824		832		840		848		856		864		872		880		888	
7		900		908		916		924		932		940		948		956		964		972		980		988		996		1004		1012		1020
8	1024		1032		1040		1048		1056		1064		1072		1080		1088		1096		1104		1112		1120		1128		1136		1144	
9		1156		1164		1172		1180		1188		1196		1204		1212		1220		1228		1236		1244		1252		1260		1268		1276
10	1280		1288		1296		1304		1312		1320		1328		1336		1344		1352		1360		1368		1376		1384		1392		1400	
11		1412		1420		1428		1436		1444		1452		1460		1468		1476		1484		1492		1500		1508		1516		1524		1532
12	1536		1544		1552		1560		1568		1576		1584		1592		1600		1608		1616		1624		1632		1640		1648		1656	
13		1668		1676		1684		1692		1700		1708		1716		1724		1732		1740		1748		1756		1764		1772		1780		1788
14	1792		1800		1808		1816		1824		1832		1840		1848		1856		1864		1872		1880		1888		1896		1904		1912	
15		1924		1932		1940		1948		1956		1964		1972		1980		1988		1996		2004		2012		2020		2028		2036		2044
16	2048		2056		2064		2072		2080		2088		2096		2104		2112		2120		2128		2136		2144		2152		2160		2168	
17		2180		2188		2196		2204		2212		2220		2228		2236		2244		2252		2260		2268		2276		2284		2292		2300
18	2304		2312		2320		2328		2336		2344		2352		2360		2368		2376		2384		2392		2400		2408		2416		2424	
19		2436		2444		2452		2460		2468		2476		2484		2492		2500		2508		2516		2524		2532		2540		2548		2556
20	2560		2568		2576		2584		2592		2600		2608		2616		2624		2632		2640		2648		2656		2664		2672		2680	
21		2692		2700		2708		2716		2724		2732		2740		2748		2756		2764		2772		2780		2788		2796		2804		2812
22	2816		2824		2832		2840		2848		2856		2864		2872		2880		2888		2896		2904		2912		2920		2928		2936	
23		2948		2956		2964		2972		2980		2988		2996		3004		3012		3020		3028		3036		3044		3052		3060		3068
24	3072		3080		3088		3096		3104		3112		3120		3128		3136		3144		3152		3160		3168		3176		3184		3192	
25		3204		3212		3220		3228		3236		3244		3252		3260		3268		3276		3284		3292		3300		3308		3316		3324
26	3328		3336		3344		3352		3360		3368		3376		3384		3392		3400		3408		3416		3424		3432		3440		3448	
27		3460		3468		3476		3484		3492		3500		3508		3516		3524		3532		3540		3548		3556		3564		3572		3580
28	3584		3592		3600		3608		3616		3624		3632		3640		3648		3656		3664		3672		3680		3688		3696		3704	
29		3716		3724		3732		3740		3748		3756		3764		3772		3780		3788		3796		3804		3812		3820		3828		3836
30	3840		3848		3856		3864		3872		3880		3888		3896		3904		3912		3920		3928		3936		3944		3952		3960	

Figure 2

132		140		148		156		164		172		180	
	200		208		216		224		232		240		248
260		268		276		284		292		300		308	
	328		336		344		352		360		368		376
388		396		404		412		420		428		436	
	456		464		472		480		488		496		504
516		524		532		540		548		556		564	
	584		592		600		608		616		624		632
644		652		660		668		676		684		692	
	712		720		728		736		744		752		760
772		780		788		796		804		812		820	

Figure 3

Illustration: Jon Davis



are a few notes on some of the lines in the program:

Line 10 — Why do I perform this GOTO 760? I have learnt that it is a good idea to put my subroutines near the beginning of the program. There are two reasons for this.

- The interpreter searches for line numbers from the beginning of the program and so it is marginally faster. I experimented with this in a program on the ZX81 and found that I could save several seconds by moving a subroutine from line 9000 to line 20.
- It saves space. GOSUB50000 costs 6 bytes but GOSUB50 only costs 3.

You will discover that I am a byte-miser and will try anything if I can save a few bytes as a result. You can see therefore that by jumping to line 760, I leave room for subroutines.

Line 190 — POKES U and U+1 with the value of P which must be between 0 and 32767. POKE is a marvellous instruction to try out on a friend, but wait until he has typed out a long program without a single SAVE!

Line 390 — O is the GET/PUT flag. If O=1 copy BIGSCREEN to WINDOW; if O=0 copy WINDOW to BIGSCREEN. Don't forget that although USR will accept only one argument up to 32767, you can use compound arguments. In this case, I want to pass the variables ML and O. Since ML ranges from O to 3968 in steps of 8, I am able to use Bit 0 as the GET/PUT flag.

Line 440 — Obtain the address of the string in X$(V). If your computer has VARPTR then rejoice! It's missing on the ZX81 which makes using machine language somewhat cumbersome.

Line 760 — Sets MEMORY SIZE. You must use CLEAR before and after GOSUB 190. This method avoids having to remember the size each time the program is run. Many types of Basic already have this built in.

Line 1110 — The machine language routines often call other routines. This would involve POKING new addresses each time the program is run and could cause problems with 34 and zero. Instead, a fixed jump table is used (see variable RU) and its address coded into the routines.

Once you understand the principles, experiment with the routine. Remember that ML must always be an even number otherwise it will upset the GET/PUT flag. Next month I shall continue with the Internal Board and the Piece Table which looks at the make-up of the cavalry garrison and indian tribe.



Illustration: Jon Davis

WARPATH

to be continued next month

FIGURE 4

```
                00001 ;
                00002 ;
                00003 ;   CALCULATE N7 AND SP
                00004 ;
                00005 ;
0000            00010       ORG    0        ;X$(1) ROUTINE
7F6A            00011 XBH   EQU    7F6AH    ;ADDRESS OF SUBROUTINE X$(2)
6C35            00012 N9    EQU    27701D   ;SEE LINE 1100 IN BASIC PROG.
0000 CD7F0A     00020       CALL   0A7FH
0003 E5         00030       PUSH   HL
0004 7D         00040       LD     A,L
0005 E6FE       00050       AND    0FEH     ;REMOVE FLAG
0007 6F         00060       LD     L,A
0008 E67F       00080       AND    07FH
000A 4F         00080       LD     C,A      ;THIS IS VARIABLE R
000B CB25       00090       SLA    L
000D CB14       00100       RL     H
000F 44         00110       LD     B,H      ;THIS IS VARIABLE Q
0010 AF         00120       XOR    A
0011 67         00130       LD     H,A
0012 57         00140       LD     D,A
0013 79         00150       LD     A,C
0014 FE1C       00160       CP     28D      ;IS R<28?
0016 380B       00170       JR     C,XBI    ;YES
0018 FE5C       00180       CP     92D      ;IS R>92?
001A 300E       00190       JR     NC,XBJ   ;YES
001C D618       00200       SUB    24D
001E 5F         00210       LD     E,A      ;N7=R-24
001F 3E9C       00220       LD     A,156D   ;SP=156
0021 180B       00230       JR     XBK
0023 1E01       00240 XBI   LD     E,1      ;R IS LESS THAN 28
0025 1D         00250       DEC    E        ;N7=0
0026 C684       00260       ADD    A,132D   ;SP=132+R
0028 1804       00270       JR     XBK
002A 1E48       00280 XBJ   LD     E,72D    ;N7=72
002C C63C       00290       ADD    A,60D    ;SP=60+R
002E 6F         00300 XBK   LD     L,A
002F 78         00310       LD     A,B
0030 FE06       00320       CP     6        ;IS Q<6?
0032 300C       00330       JR     NC,XBM   ;NO
0034 D5         00340       PUSH   DE
0035 1601       00350       LD     D,1
0037 15         00360       DEC    D
0038 1E40       00370       LD     E,64D
003A 19         00380 XBL   ADD    HL,DE
003B 10FD       00390       DJNZ   XBL
003D D1         00400       POP    DE       ;SP=SP+64*Q
003E 1834       00410       JR     XBQ
0040 D5         00420 XBM   PUSH   DE
0041 114001     00430       LD     DE,320D
0044 19         00440       ADD    HL,DE    ;SP=SP+320
0045 D1         00450       POP    DE
0046 FE19       00460       CP     25D      ;IS Q>24
0048 3819       00470       JR     C,XBO    ;NO
004A D619       00480       SUB    25D
004C D5         00490       PUSH   DE
004D 47         00500       LD     B,A
004E 1601       00510       LD     D,1
0050 15         00520       DEC    D
0051 1E40       00530       LD     E,64D
0053 19         00540 XBN   ADD    HL,DE
0054 10FD       00550       DJNZ   XBN
0056 D1         00560       POP    DE       ;SP=SP+64*(Q-25)
0057 E5         00570       PUSH   HL
0058 260A       00580       LD     H,10D
005A 2E01       00590       LD     L,1
005C 2D         00600       DEC    L
005D 19         00610       ADD    HL,DE    ;N7=N7+2560
005E E5         00620       PUSH   HL
005F D1         00630       POP    DE
0060 E1         00640       POP    HL
0061 2811       00650       JR     Z,XBQ
0063 D605       00660 XBO   SUB    5
0065 47         00670       LD     B,A
0066 E5         00680       PUSH   HL
0067 D5         00690       PUSH   DE
0068 E1         00700       POP    HL
0069 1601       00710       LD     D,1
006B 15         00720       DEC    D
006C 1E80       00730       LD     E,128D   ;THIS IS VARIABLE Z
006E-19         00740 XBP   ADD    HL,DE
006F 10FD       00750       DJNZ   XBP
0071 E5         00760       PUSH   HL
0072 D1         00770       POP    DE       ;N7=N7+Z*(Q-5)
0073 E1         00780       POP    HL
0074 7C         00790 XBQ   LD     A,H
0075 E60F       00800       AND    0FH
0077 67         00810       LD     H,A
0078 C1         00820       POP    BC       ;GET THE FLAG
0079 E5         00830       PUSH   HL       ;SP AND N7 CALCULATED
007A D5         00840       PUSH   DE       ;SAVE UNTIL NEEDED.
007B 21356C     00850       LD     HL,N9    ;THE FOLLOWING PUTS OR GETS
007E 19         00860       ADD    HL,DE    ;THE BIG SCREEN AND PRINTS
007F EB         00870       EX     DE,HL    ;THE COORDINATES
0000            01480       END
00000 TOTAL ERRORS
```

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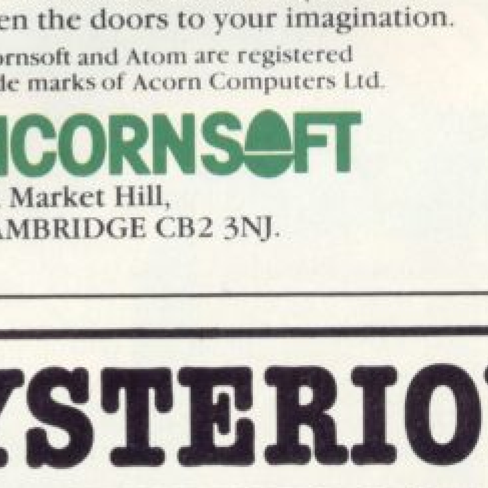
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IN-BETWEEN THE LINES

To produce graphics that move, a technique known as "in-betweening" can be used to automatically give the stages in an animated sequence.

As its name suggests, when given starting and finishing pictures, the technique will provide all the frames in between, and in the correct order. This method has been used in one form or another to help automate the production of cartoon films.

Computers have been adopted to relieve artists of the routine tasks of creating the in-between frames for many sequences.

To begin with a simple example, the frame that is half way between a square and a tall thin rectangle can be constructed as shown in figure 1. The dashed lines show the paths from the points on the first frame to the corresponding points on the last frame. The frame that is half way between the first and the last is virtually half way along these paths.

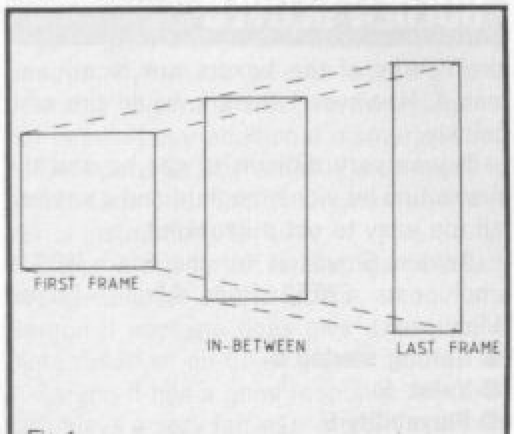


Fig 1

The in-between frame in this example has the shape that we would expect. It has been produced entirely by geometric means, and any number of in-between frames could have been generated in essentially the same way. It only remains to develop a program to carry out the same process.

In writing the program, we must first decide how a picture is to be stored, since we must provide the initial and final pictures. We can do this by storing the column and row positions of every point that has to be joined up in order to draw the picture in two arrays.

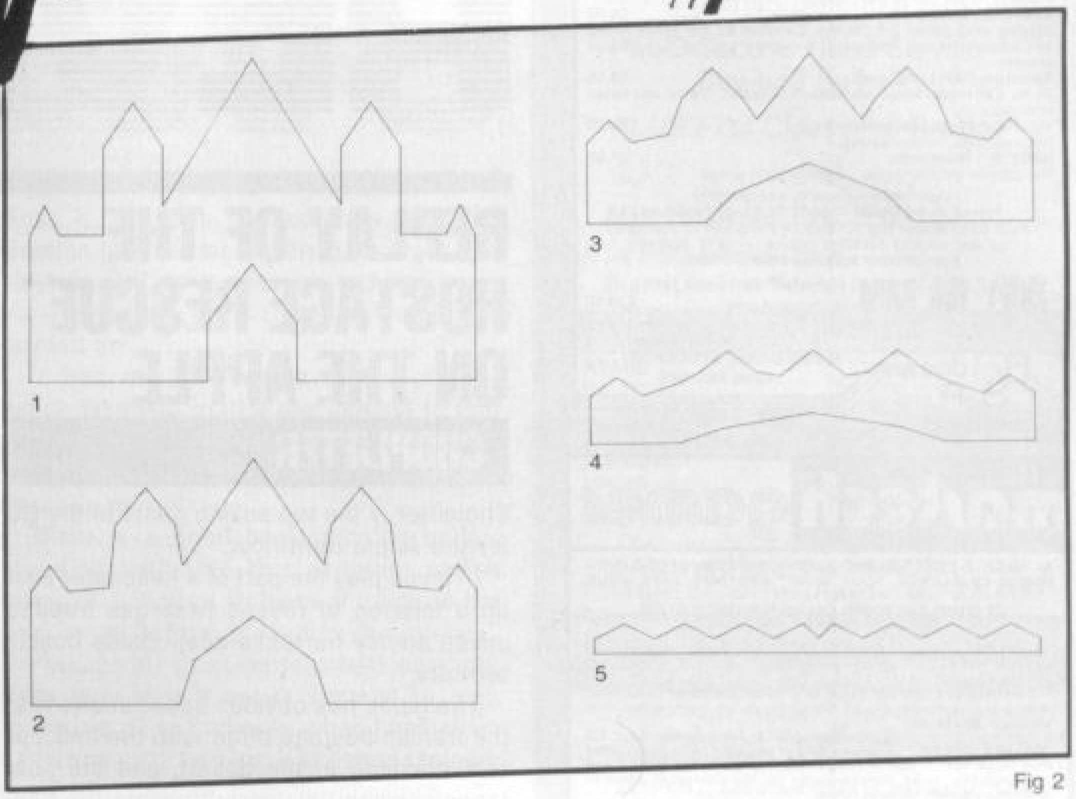


Fig 2

We shall store the column and row positions respectively for the first picture in the arrays XF and YF, and for the last picture in the arrays XL and YL.

The following program will then draw the first frame, an in-between frame half way between the first and last frames, and then the last frame. It assumes that the frames are each drawn by joining 25 points, but this number can be changed throughout to any other.

```
10 DIM
   XF(25),YF(25),XL(25),YL(25)
20 REM ENTER COLUMN AND
   ROW POSITIONS
30 REM FOR FIRST AND LAST
   FRAMES
100  REM DRAW FIRST FRAME
110 MOVE XF(1),YF(1)
120 FOR J=2 TO 25
130 DRAW XF(J),YF(J)
140 NEXT J
200 REM DRAW IN-BETWEEN
FRAME
210 MOVE (XF(1)+XL(1))/
    2,(YF(1)=YL(1))/2
220 FOR J=2 TO 25
          230 DRAW (XF(J)+XL(J))
            /2,(YF(J)+YL(J))/2
240 NEXT J
400 REM DRAW LAST FRAME
410 MOVE XL(1),YL(1)
420 FOR J=2 TO 25
430 DRAW XL(J),YL(J)
440 NEXT J
```

The program can be developed further to draw any number of frames in between the first and the last. The program is written so that the user can enter the number of in-between frames that is required. The program is obtained by replacing all the lines with line numbers in the two-hundreds in the previous program with the following segment.

```
200 REM DRAW ANY NUMBER
    OF IN-BETWEEN FRAMES
210 INPUT "NUMBER OF IN-
BETWEEN FRAMES",NF
220 FOR I=1 TO NF
230 X=(XF(1)*(NF+1-I)+XL(1)*I)/
(NF+1)
240 Y=(YF(1)*(NF+1-I)+YL(1)*I)/
(NF+1)
250 MOVE X,Y
260 FOR J=2 TO 25
270 X=(XF(J)*(NF+1−I)+XL(J)*I)/
(NF+1)
280 Y=(YF(J)*(NF+1−I)+YL(J)*I)/
(NF+1)
290 DRAW X,Y
300 NEXT J
310 NEXT I
```

The sequence shown in figure 2 was produced with this program. In order to generate realistic sequences, the initial and final frames should not be too dissimilar. However, when very different frames are used for the first and last ones, some very interesting, and sometimes artistic, results can be obtained.

BY GARRY MARSHALL

'WARE SOFTWARE SOFTWARE SOFTWARE SOF

REVIEWS

REPLAY OF THE HOSTAGE RESCUE ON THE APPLE

CHOPLIFTER

Choplifter is the top selling game in the US for the Apple right now.

In it you play the part of a helicopter pilot on a mission to rescue hostages trapped inside enemy barracks deep inside hostile territory.

The game has obvious associations with the Iranian hostage affair with the helicopters crashing in the desert, and the hostages running helplessly towards the helicopter, with enemy tanks in hot pursuit. No mention is made of the affair of course in the interest of good taste, but whatever Choplifters associations it is undoubtedly an impressive game.

The graphics are superb. The running motion of the hostages has been excellently simulated as has the flight of the helicopter.

Each time you rescue a hostage the computer emits a high-pitched bleep telling you that the hostage is safely aboard.

You can only carry sixteen hostages without overloading the chopper so you will have to make more than one sortie into enemy territory.

The number of hostages rescued and tanks destroyed is recorded at the top of the screen.

Advanced pilots will have to deal with jet fighters called up by the enemy when a chopper pilot is being a little too successful in liberating the hostages.

The game is best played with joysticks although the reviewer played quite an interesting game using paddles. The helicopter can fly backwards forwards and sideways — leaning into a dive most realistically. It is also quite difficult to control and will take you some time to master just as a real helicopter would.

Choplifter is manufactured by US Apple games specialists Broderbund. The game is imported into the UK by SBD Software of Richmond and can be purchased at £19.95 plus VAT from the London firm.

- **Getting started 9**
- **Playability 8**
- **Value for money 7**

THIS ONE WILL GO DOWN FIGHTING

GOLDEN GLOVES

Golden Gloves is all about the noble art of boxing. You can either take control of a boxer and fight a friend or the computer.

The computer will also fight an exhibition match with itself.

After naming your boxer the screen switches to a view of the ringside. Your fighter is in the left hand corner. The bell rings and you come out fighting.

You guide your boxer with the joystick. Moving it left or right moves your boxer across the screen. Pulling it down makes him duck and pushing it up makes him unleash his best uppercut. Pressing the trigger button allows him to jab.

The computer boxer — Rocky — is a mean and hard hitter. You will have to be on your toes to avoid the knockout.

Indeed it takes a good fighter to last more than one round with him. If you do get knocked down the count starts and if you are still on the canvas at ten then you have lost and you are asked for a rematch.

If you manage to avoid a knockout and go through the three, two minute rounds then the winner is the player with the most points. These are awarded for the number of punches that are landed and the number of times your opponent has been on the canvas.

Golden Gloves is a colourful game and the figures of the boxers are nicely animated. However I think I would tire of it quickly.

It was very difficult to get beyond the first round let alone the third and it seemed all too easy to get a knockout.

Golden Gloves is for the Atari 400/800 and costs £20.50 from Allrian, Hayes, Middlesex

- **Getting started 9**
- **Value 5**
- **Playability 5**



FTWARE SO FTWARE SOFTWARE SOF

REVIEWS



ALL THE KING'S MEN PLAYING AROUND WITH VIC

VIC CHESS

So you want to play chess on the Vic? Well we looked up three ways of turning the Vic-20 into a chess opponent.

Let's start with Commodore's offering, Sargon II, which comes at £21.70 in cartridge form and has the advantage of not needing any additional memory.

The board display is easily distinguished and it does offer the most comprehensive set of instructions for use.

Chess is the sort of familiar game which you need a lot of instruction on and the Sargon II package does give a very complete rundown on its six levels.

Sargon II has a good response time and also plays a very fair opening without ever suggesting it had any book theory crammed into its memory.

Contrary to chess players who feel that a machine should be judged on the number of different levels it boasts, six is quite enough and probably more than most chess players will find a use for.

It is hard to fault this well-presented cartridge except on price which does not compare favourably with its two rivals, but remember that both of these will need additional memory to play. It is available from all good Commodore dealers.

- **Getting Started 10**
- **Value 8**
- **Playability 7**

Boss is a chess phenomenon. How its German programmers managed to get it to play as well as it does on just the basic Vic-20 and an 8K memory expansion is beyond me.

It has nought-to-nine levels of play which take you from a one second to four hours response time but my own favourite was level 2 which responded in five seconds on average.

There is a good book opening understanding built into this program and it followed a Sicilian Defence through to the sixth move before attempting the unusual.

Perhaps the most impressive thing about Boss was that it never seemed to stop trying in a game and even when I had given games up as draws it still attempted to gain something positive from the positions.

Boss' display is the best of the three and it accepts four key move entries. It also runs independent chess clocks on both players and offers the additional challenge of trying to beat it while only taking five seconds per move.

On the minus side: it is difficult to spot the moves as the pieces don't flash, there are some terse instructions and it displays the mate and stalemate comments in German. Also it took me three loads the first time to get it into a Vic. It costs £14.99 from Reading-based Audiogenic.

- **Getting started 6**
- **Value 9**
- **Playability 8**

Bug-Byte's advantage is on the price side but it has also done away with the overused notion of chess levels.

It also offers a menu enabling you to change how far the computer looks ahead, list out the moves made, set up chosen positions or save the current position.

The tape loaded first time everytime but you need a full extra 16K's worth of memory to play it.

The Bug-Byte's display was the least impressive with the King and Queen symbols initially confusing.

The program gets around the need for levels by letting the player input a three figure number from 0 to 9.99.

The number before the decimal point is the moves it looks ahead, the number after refers to the number of moves the computer will consider at each play.

Playing the Sicilian Defence this program also went "out of book" after two moves.

From Liverpool-based Bug-Byte at £7.

- **Getting started 9**
- **Value 7**
- **Playability 5**

REVIEWS

MASTERING THE ROGUE ROCKS

ASTEROIDS

Asteroids became one of the craze games of the early 1980's after the worldwide successes of such mega-games as Space Invaders and Galaxians.

It is considerably more difficult than those earlier games, where you had really only two controls to worry about. Asteroids added hyperspace, thrust, rotate left, rotate right and fire.

The game places you in control of space ship being bombarded by a shower of meteorites that come at you relentlessly from the four corners of the screen.

Using your controls you must spin your ship around to shoot the asteroids.

You can also dodge in front or behind the rocks using the thrust button.

If things get a little too hot and a collision seems certain the hyperspace button will make you momentarily disappear and then replace you at random on the screen. But this could prove as dangerous as blasting away at the oncoming role!



Extra points can be earned by shooting down the mystery flying saucers which spin in and out of the asteroids.

We tested versions of the game so far available for the Sinclair Spectrum.

Meteor Storm was the closest to the arcade version of the three games we tested. The asteroids were represented as geometrical line drawings drifting weightlessly towards your ship.

The game displayed clear instructions on the screen and also showed you the value of the various asteroids and flying saucers on the screen.

All three games kept a running total of the high scores but Quicksilva's Meteor Storm took you a stage further than this enabling you to enter the initials of the top ten high scorers of the session.

This version also provides you with a keyboard overlay which, although it seems just like a gimmick, is actually quite useful in Asteroids-type games where you have up to five controls to concentrate on.

My main criticism of Meteor Storm is that the thrust button has inertia, causing you to drift helplessly towards an asteroid, frantically rotating and thrusting.

Sinclair's official software writers, Psion, entered the field with Planetoids. This is not as close to the arcade game as the Quicksilva version though the graphics are no less impressive for this.

Planetoids had the best fire mechanism of the three games tested. The missiles could be fired in quick succession and reached their targets swiftly.

The final version tested was Meteoroids from the new software writers — Softek.

This was not as good a version of the game as the others played. An admirable attempt had been made to simulate the rock-like texture of the asteroids but this did not work. They looked more like chewed up pieces of bubble gum.

There was really not much to choose between the other two — though for my £5 the Quicksilva version is marginally better because of its extra facilities and graphics.

Meteor Storm
- **Getting started 5**
- **Value 7**
- **Playability 8**

Meteoroids
- **Getting started 5**
- **Value 5**
- **Playability 6**

Planetoids
- **Getting started 5**
- **Value 6**
- **Playability 7**

Illustration: Jon Davis

REVIEWS

DEFINITELY NOT THE BEST GAMES IN THE WORLD

ICL GAMES PACK

ICL Games Packs numbers one to four for the Sinclair Spectrum are proving to be consistently unpopular with the *C&VG* review team.

Games Pack Three received a mere two out of ten for playability in these review pages together with some particularly harsh criticism of the games graphics. This month we test the playability and value for money of Packs One, Two and Four.

Games Pack One features four games previously available for the ZX-81. The best of these is Racetrack a familiar steer your car around the racetrack type game.

Labyrinth is a very poor maze game and can only be recommended to people who enjoy improving games.

Martian Knockout is the token action space game on this pack. I say token because the game is about as playable as a Frisbee in a hurricane.

Skittles is the final offering on Games Pack One and if you are inclined to think that this may be a cheaper way of playing the game then forget it.

Games Pack Two kicked off with Galactic Invasion a game that is practically identical to Martian Knockout.

Drop a Brick, the second game on this pack is a very poor attempt at the popular video game — Breakout.

Colour Doodle is a so so children's colouring game.

The saving grace of Games Pack Two is the final game, Train Race. This is a gambling game for three players with each player picking a train of a certain colour.

Games Pack Four was the best of the three I tested. Docking the Space Ship is a fairly mediocre version of Lunar Lander.

Journey into Danger is much better. This is a mini-Adventure complete with all the features which you would normally associate with a much larger program.

Invasion from Jupiter is a pretty poor space shoot-out game.

The Great Escape is the final game on this cassette and good fun it is too.

Games Pack One
- **Getting Started 9**
- **Value 3**
- **Playability 3**

Games Pack Two
- **Getting Started 9**
- **Value 4**
- **Playability 4**

Games Pack Four
- **Getting Started 9**
- **Value 5**
- **Playability 5**

AN IMPRESSIVE ARCADE CLONE

AIRSTRIKE

Airstrike is a very well executed derivative of the popular arcade game Scramble.

The object of the game is to pilot your spaceship through underground caverns while avoiding numerous obstacles that are placed in your flight path.

The first obstacles to be overcome are surface to air missiles and the occasional floating mine. On your way through this part of the cavern you can pick up more ammunition and fuel. In the second part of the cavern you may have to deal with a whole series of floating mines.

Once through this part you come across a series of airlocks. The only way to get past these is to shoot the middle out of them and manoeuvre your craft through the resulting hole.

Just to make things a little more exciting you may also come across the occasional fighter trying to shoot you down.

Each level has a different colour and your craft carries less ammunition due to the higher gravity.

This really is a most impressive game and the English Software Company are to be congratulated.

Airstrike is available from Gemini Electronics of Manchester at £19.95. The game runs on an Atari 400 and 800 in 16K with a disk version also available.

- **Getting Started 8**
- **Value 8**
- **Playability 8**



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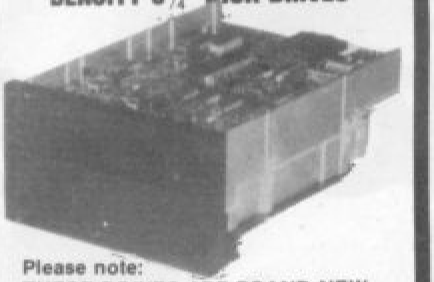


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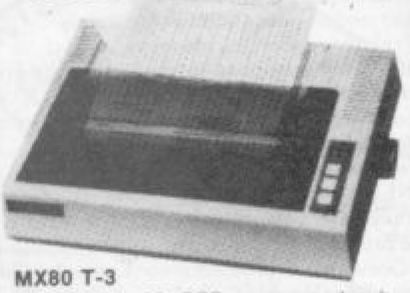
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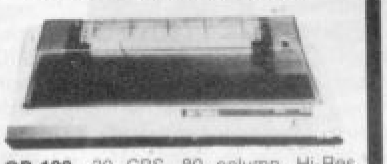
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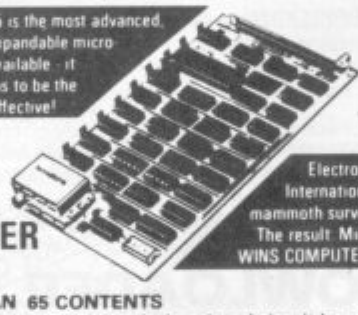
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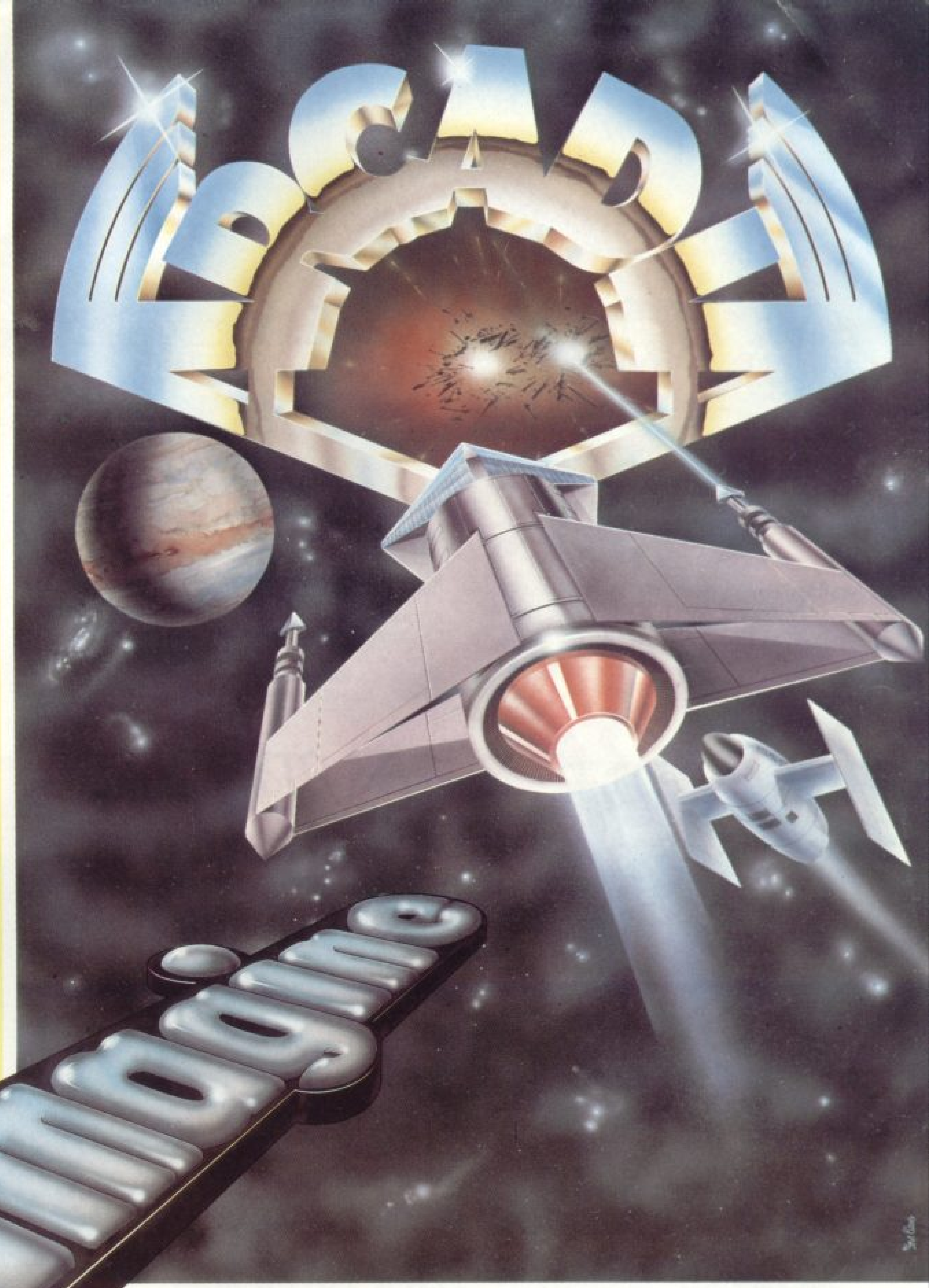
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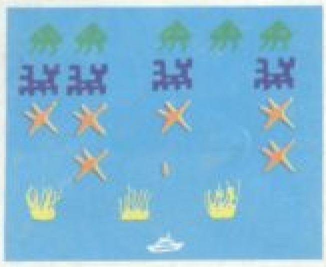
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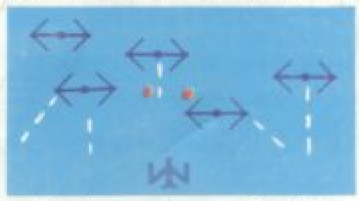
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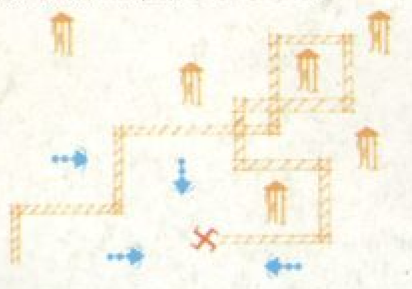


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